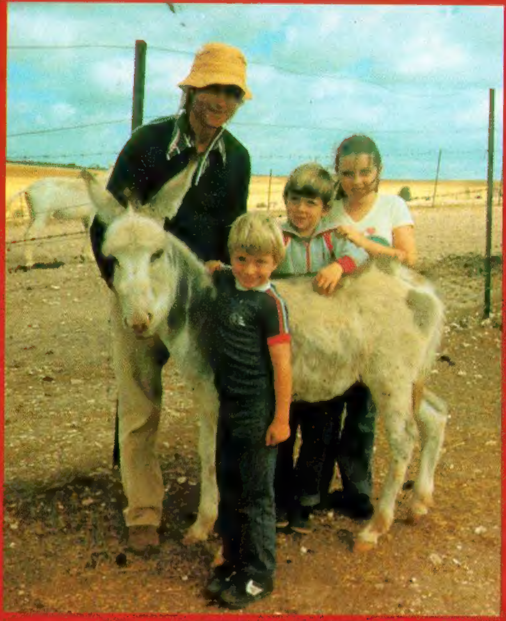
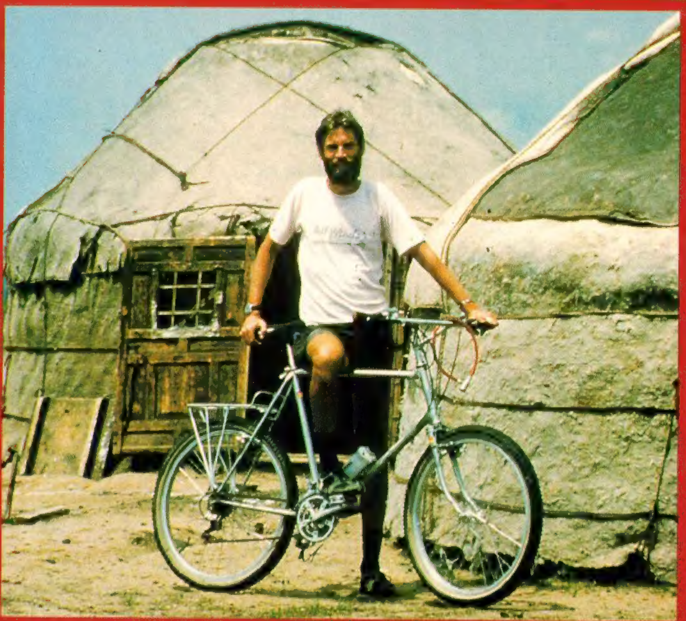
No. 47 August, 1985 — $2.75*

EARTH GARDEN





Practical projects

- Hanging a door, household plumbing, drains for rains, a water wheel pump, the sun-pump, low voltage safety, home energy troubleshooting, methane in China, the electronic cottage, bee tools, bringing batteries back from the dead.
- *Now the pedal juicer!* — Build Peter van der Wyk's pedal machine for juicing, blending, drilling and grinding (and good exercise too!)
- *Cycling the Mongolian Grasslands.*
- *Plus:* The Aussie yurt, a living from the land, keeping animals without cruelty, breeding brown sheep, Greenham Common, pigeon peas, new settlers' stories.

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BARGAIN!

The Illustrated EARTH GARDEN HERBAL

Compiled by Keith Vincent Smith

Nelson, Melbourne, 1978, 157 pages. Our price posted, $5.50

Incredible value! We have bought a large quantity of The Earth Garden Herbal especially to offer this bargain to our readers. The publisher's recommended retail price is $14.95, but we will mail this quality book anywhere in Australia for only $5.50 (add $1.00 if you would like a copy sent overseas by seamail).

This is an ideal gift for anyone who loves herbs and gardens, or the classic books about them. It is printed on fine white paper, with text and 120 woodcut illustrations based on the classic 16th century Herbals and earlier manuscripts. It covers the facts, fantasy and folklore of 40 herbs, adding a modern commentary on how to identify, grow and use them today.

Here, ancient authors like Dioscorides (60AD), Pliny the Elder (77AD), Walafrid Strabo (840AD), John Gerard (1597), Nicholas Culpeper (1653) and John Evelyn (1699) speak again with delight about these beautiful, aromatic plants.

In this collection you will find herbs to bring up the highlights of fair hair (chamomile), to make the heart merry (borage), to protect against lightning (bay laurel), to keep away snakes (mugwort or tarragon), to get thin (fennel), 'for hem that speke in slepe' (southernwood or lad's love) and to 'pierce the senses' with its sweet smell (lavender).

There are recipes for making herb-scented candles, incense, herb vinegars, oils and salves, lavender sachets, tussie-mussies, rosemary conserve, candied angelica, borage conserve, bouquet garni, honey of roses, cauliflower and cucumber dill pickles, Hungary water, marigold pudding, nasturtium 'capers', parsley soup, sage and caraway cheese, apple tansy, syrup of violets and a pot-pourri that will still smell sweet in 50 years. Find out how to plant by the signs of the Zodiac, design a knot garden or a maze, build a garden seat of thyme, use companion herbs and herb sprays as insecticides.

Don't miss out. Fill in the order form on page 58 for your copy — Christmas is coming!

EARTH GARDEN 47

Earth Garden, started in 1972, is the original Australian journal of self-reliance. It is intended as a friendly forum of practical ideas, shared knowledge, sources and alternatives.
It's about putting a roof over your head, growing your own food, using alternative energy and surviving — and thriving — in the city or the bush and the inner changes which follow when you are in tune with nature.

Earth Garden is published each quarter in mid-February, May, August and November. Annual subscription is $11.00.

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Let us lead you up Earth Garden's path to the good life!

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The cover

Front: Top left: Armin Ptak with children and donkey at his Roaring Lion Donkey Stud at Undalya, South Australia. *Right:* Robert Fletcher of Tailwinds Bicycle Touring outside a felt yurt on the Grasslands of Inner Mongolia. *Below:* Water wheel pump at Robert Martin's Northern Light Farm at Ravenshoe, Queensland.
Back: Rows of cauliflowers, well composted and mulched, grow at Jacqueline French's farm in the NSW Southern Tablelands.

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A trip to Goodwin Sands

By John Wolfe

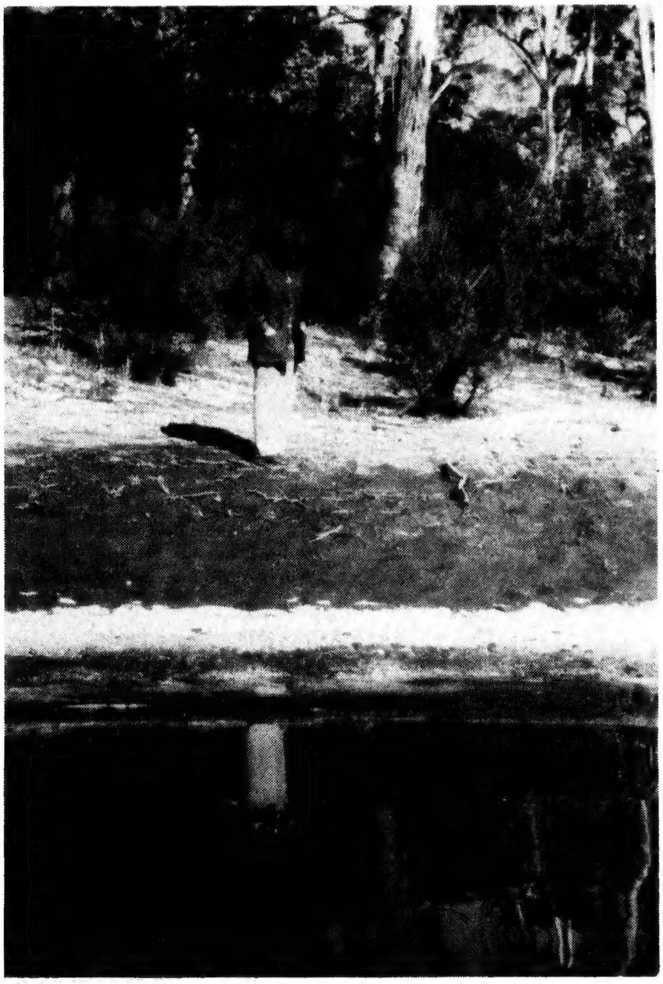
"It's time we had a day off!" came a grumpy voice from the garden.

"I'm sick of splitting this hard wood!" said someone else.

Mutiny appeared imminent. It seemed about time for the workers' annual picnic. "What about Goodwin Sands?" I suggested.

In times of yore our picnic consisted of a trip by dinghy to Mallacoota Inlet to gather oysters. A highlight of the following days was a cauldron of delicious soup. This annual feast came to an end two years ago when we made the discovery that the oysters had died. That's right, the whole lot of them, all over the lake. Just empty shells left, with crabs living in them. When we found all these dead oysters I scratched my head and thought this is sort of serious, like the grass dying or something. So next time I saw the Fisheries' Officer I mentioned it to him and, stranger still, he didn't even seem to be interested.

Well, next thing, there's this fisherman friend of mine who's had a licence for about 40 years in the inlet. He told me there's something funny going on at Goodwin Sands. I said what's the matter and he said I dunno, but you better go and have a look for yourself. You see, this Goodwin Sands is a famous place for locals and tourists and you could go there one time and gather a bag of oysters, no trouble. The sands are covered and uncovered by the tides and form a feeding ground for the fish as the vivalve shellfish live in the sand and the fish eat the shellfish.



Mallacoota Inlet. Sandy beach to mudbank, stage 1.

Anyway, we have a democratic vote and the Goodwin Sands is picked for the big day out. Next morning we stare anxiously at the sky and, you beauty, she's clear with no wind. If you know our boat, you'll know why we look anxious. That lake can get rough out there. Not only that, the moment we leave the river for the open water seems to be the signal for gale-force winds and mountainous seas to appear from nowhere.

But we all give a jolly heave-ho and the good ship Biduelli is dragged from the mud under the wattle tree and an army of crabs goes rushing for cover. The Biduelli is an 11 foot dinghy with a 10 hp motor. When the motor fails there is an auxiliary motivation system — wooden sticks called paddles. The provision box is carefully checked. No mistakes like those on previous trips when trifles like tea, water or matches were forgotten. Sparkplug spanner and shearpin? Bucket for baling? Okay.

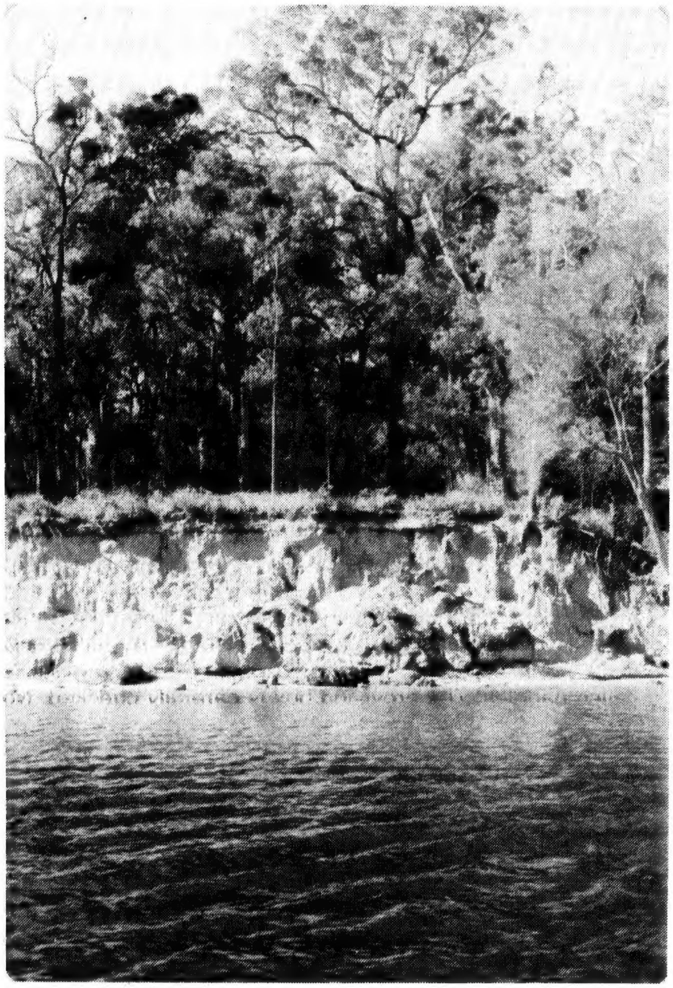
We cross the sandbar of the Genoa River and greet John M, who is patiently re-erecting the guide-posts through the channel for about the hundreth time. Tourists in super-colossal power boats keep knocking them down. But the river is getting shallower, only 2 feet now at low tide. It's hard to believe that big boats once went to Genoa Bridge, 7 km upstream.

Then we meet a boat coming from the lake and it's Roger and his goat. That's right, a sea-faring goat. Strangers freak out when they see the goat, but we're used to stuff like that around Gypsy Point. Maybe you've heard about the kangaroo that goes into the pub? Fair dinkum. Anyway we wave to Roger and the goat gets up on the roof of the cabin and does a little dance. Then we come to the junction of the mighty Wallagaraugh. Mud all the way.

Where does the mud come from? Well, you see, the Wallagaraugh and Genoa river catchments are in the New South Wales woodchip zone. Steep slopes. Clearfelling. Huge logging machines. Got the picture?

At this point, dreaming along at about one mile an hour through the mud, we hear a terrible roar from behind and a mighty colossal prestige boat comes hurtling at us from out of the Wallagaraugh backwater, nearly swamping us with the bow wave. This monster leaves us rocking in a surge of white water, staring at rapidly disappearing twin 80 HP motors. A few minutes later we round a bend and catch up with the monster. There is a lot of shouting and the mighty craft seems to be stuck on a mudbank.

We round Cape Horn (yes, this is Mallacoota Inlet, not some Jack London yarn) and Top Lake is a bit choppy, but not too bad. We get good vibes crossing the lake because people on the other side really look after the native creatures. To give you some idea, these folk get birdseed by the 50kg bag. Their garden is a moving cloud of native finches. Blue Wrens all over the verandah. What's that, Blue Wrens don't eat birdseed, you say? I'm coming to that. For the wrens they buy *whole cheeses* and crumb



them up! They've really got birds. There's also a pet wombat that chews your shoelaces off, but that's another story.

As we chug towards Goodwin Sands I'd like to tell you how the people around Mallacoota have got pretty good about birds and things. For instance, a lot of them don't keep cats any more. When old Tabby chucks in the towel they get a bird table as a replacement.

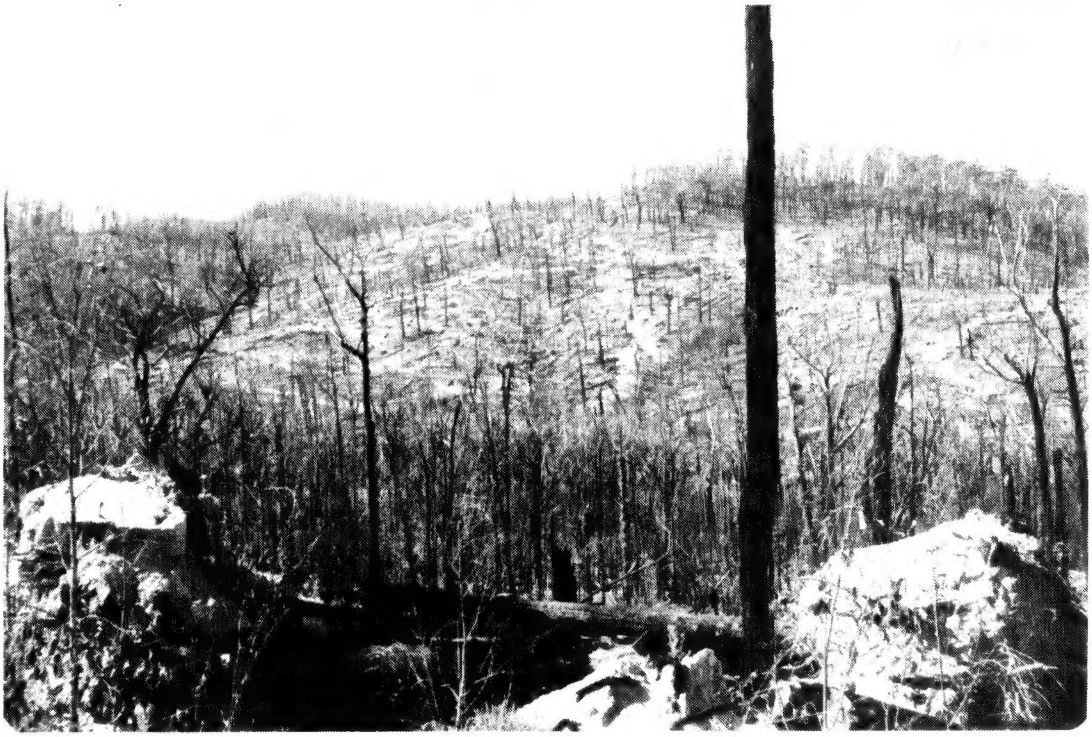
Some folk have stopped using poison sprays. Maybe they might use a bit of garlic spray or soapy water or even a bit of white oil and squash aphis with their thumb. They've stopped grabbing a can and going out like Buck Rogers with a death ray every time they see a few insects. Zap. Half the time flattening the bees and the ladybirds while they wonder why the garden is not getting ahead. Then a Blue Wren comes along and sees the insects staggering around. He doesn't know they've been sprayed. Peck, peck, peck. Next minute the poor little bird is feeling pretty crook and if he's not lucky it's curtains.

We're coming up to the Narrows now, so I'll just tell you how to get your directions at sea if you haven't got a compass. Tie a piece of string to your watch and swing it round your head, then let go. Your watch will go west.

Through the deep water of the Narrows goes the good old Biduelli and we are intrigued to see long swirling strands of coloured material below us. This turns out to be slime moved by the tidal currents.

A shout of "Ghosts!" has us all staring into the depths. Sure enough, strange white elliptical objects are expanding and contracting, rising and sinking in the greenish water. They are tentacled jellyfish, pulsating gently like phantom visitors from another world. But these jellyfish have really and truly become ghosts. Their once transparent bodies have been made translucent by the deposit of pollutants in their tissues, the unfortunate jellyfish acting as efficient water-filters.

It's like this. The effluent pipe from Mallacoota empties *inside* the inlet. The authorities open the pipe when the tide



Above: Flood erosion at Cape Horn.
At right: Where the mud comes from — woodchipped catchment of Mallacoota Inlet.

is running *out*, which is good thinking. Unfortunately, during the tourist season when the sewage system is overloaded, the pipe runs all the time. Happy days, all the muck goes rushing along with the tide into the lake and river system. The result is smelly mud, "Do Not Swim Here" notices and bearded experts taking water samples for *E. coli* concentrations.

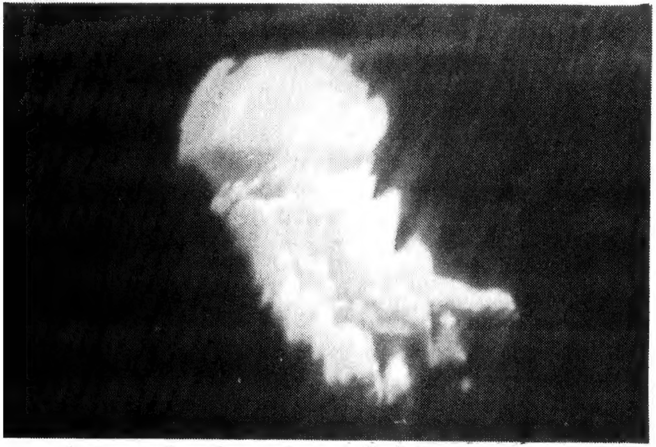
Well, here we are at the "sands", which is an area about a mile square appearing and disappearing as the tides rise and fall. Sure enough, mud and dead shellfish as far as the eye can see. On the Mallacoota side, waterweed has already taken root over a big area of the mud and about a thousand swans are getting stuck into it. We drag the Biduelli up on the bank and go on a squelchy walkabout. One species of shellfish we called "painted ladies" when I was a kid have adapted to life in the mud. The rest are past history. Sorry folks, the cockles are goners, just dead shell and smelly mud. After an hour of searching, Melissa gave a cry of triumph. "One small oyster, *still alive!* Hope springs eternal.

Time for lunch at Owen Head. "Where's the billy-can?"

"I thought you . . ."

"There's no margarine in the box."

"Ah well, bread and water is better than nothing." Desperate for billy tea, I studied the horizon. What's this? The aforementioned powerboat has arrived at a distant picnic point and two ocker types can be discerned bending the elbow. A walk of about one mile and two empty beer cans are secured. Just pop the tea-bags in the slot at the top. Fresh tea, no worries. That's ingenuity, I explain to the crew.



A 'sea-ghost' — live jellyfish impregnated by pollutants become translucent.

There's a glorious view to the distant mountains, but we try to ignore the savaged ridgeline near Mt Nadgee.

Stratus clouds have been sighted in the sky, a sure sign of trouble for the family boat. "Better get going Dad."

"But I want to visit the Spotted Dog" (an old gold mine).

Mutterings are heard. Another mutiny appears imminent. "Remember the time" says David, "when we were stuck over here for two days and lived on crabs and a bag of muesili?" I remembered. "Okay," I said. "Let's beat it." There was a rush for the boat. "Take the tiller, David," I ordered, trying to sound like Captain Bligh. Too late. Everyone has crowded into the bow, leaving me place of honour at the motor. Little white waves had appeared on the lake and the crew knew what that meant. Grimly, I took my place, ready for the water sloshing which awaited me.

HOME OWNERS' CLUB LTD

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Membership fee $35.00.

The Home Owners' Club Ltd is associated with the Sydney Building Information Centre Ltd which advises home builders and exhibits building products at its Sydney headquarters in Surry Hills, Sydney. Members may obtain free advice by phone or mail, use the library of building books and housing magazines and take part in handyman courses run by building experts like Bob Ryan and Dieter Mylius. They receive the club's bi-monthly magazine and can get discounts on books and building materials. Affiliated clubs are expected to open soon in other states.

access

JOY OF LIVING FESTIVAL

Wollongong, NSW, October 1985.

The Art of Living Foundation offers young people, especially those out of work, ways of improving their well-being by taking charge of their health and developing skills through education, creativity, natural health and healing. The Joy of Living Festival is a focus for the Foundation's aims through exhibitions and workshops with the theme of peace.

Basic membership of the Foundation is $10.00 annually.

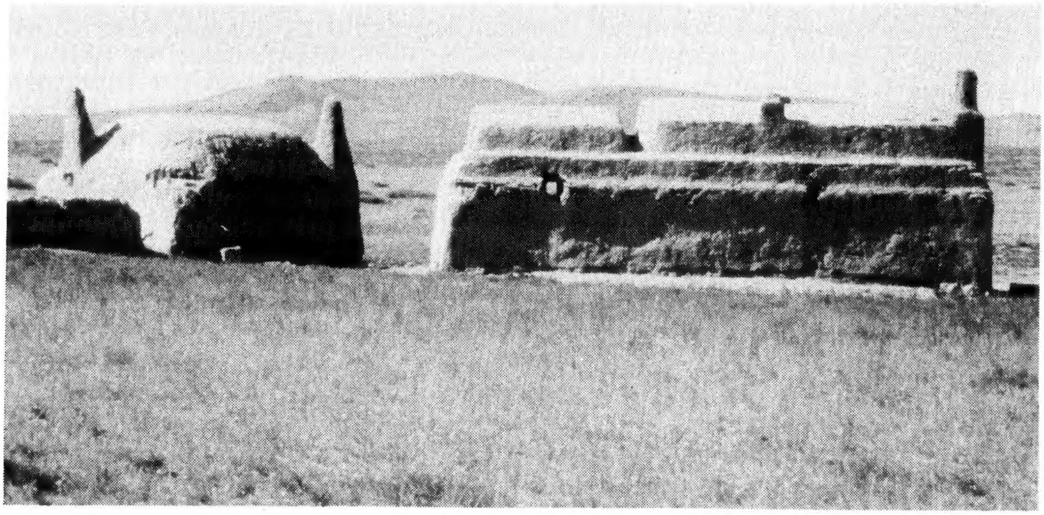
☐ **Joy of Living Festival**

Information from Art of Living Foundation (Australia), 63 Dobbie Avenue, East Corrimal, NSW 2518.

THE NEW AGE BOOKSHOP

Shop 35, Fountain Plaza, Bendigo, Victoria 3550

This new shop has books and cassette tapes on New Age subjects such as astrology, meditation, dreams, Edgar Cayce, spiritual healing, reincarnation, health and herbalism and alternative lifestyles like keeping animals, self-sufficiency and herbs, plus items like Tarot cards, crystals and incense. You can join the cassette tape library for $5.00 annually and hire tapes at 50c per week. Books are available by mail order, send SAE for further information.



Cycling the Mongolian Grasslands

By Robert Fletcher

"Widespread snowfalls in New South Wales ... 3 degrees in Melbourne this morning."

The Australian winter had hit with a vengeance, but there was an air of smugness about our group, for soon we would escape these cold July mornings.

Our destination was Beijing and then Inner Mongolia. Our party was to make history as the first from Australia to undertake a cycling expedition through the Grasslands of this region of China.

Beijing, of course, was warm amd hazy. The schedule was hectic as we wanted to see as many of the city's highlights as we could. The grandeur of the Forbidden City, the elegance of the Summer Palace and the mammoth work behind the Great Wall reminded us of the power of past Dynasties.

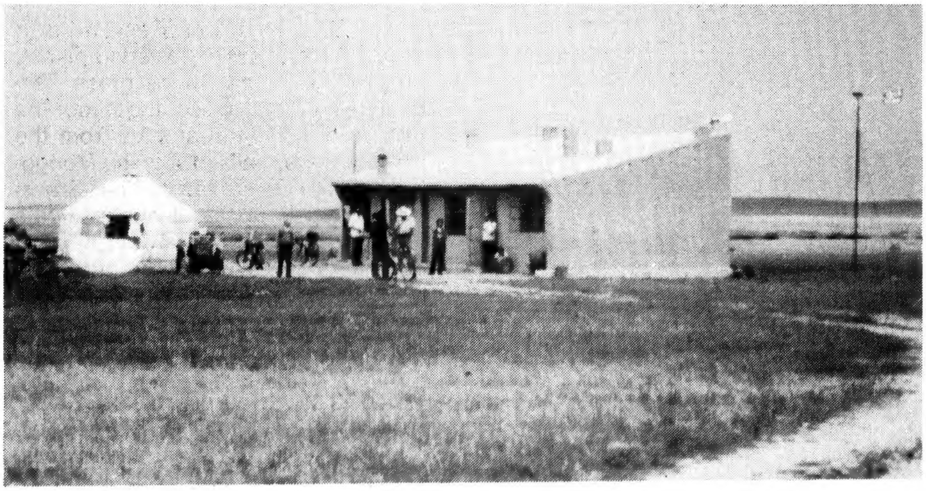
As we stood on the Great Wall, a monumental epitaph to the fear of the Mongols traditionally held by those in central China, we looked at the land beyond. Mongolia, a name that stirs the fires of the imagination. It was something to consider that soon it would be underneath the wheels of our specially prepared bicyles.

It was a slow trip in our comfortable first-class railway sleeper with its lace tablecloth, bedside lamp, velvet curtains and, of course, a thermos flask of hot water for making tea. The smell and the sound of the steam engine added to the romantic aura. The overnight train from Beijing to Datong winds its way through the towering Xiong'er Mountains dotted with remnants of the Great Wall. Vast plains, intensively cultivated, extend for miles, surrounded by craggy mountains.

Mudbrick houses, all with high, thick walls facing north and bright glass windows facing south, reflect centuries of care in design aimed at keeping out the bitterly cold winds from the Polar regions that sweep across Siberia and the Mongolian Plateau bringing temperatures down to —40°C.

Datong is a bustling city over 2,000 years old and the centre of one of China's major coalfields. The earliest examples of religious stone carvings in China are found nearby at Yungang. Carved in the 5th century, the 53 caves there contain 51,000 bas-reliefs and statues ranging in height from a few centimetres to 17 metres. Cave temple art originated in India and Yungang caves show influences from India, Persia, Byzantium and Greece.

Other attractions in Datong include the *Temple in Mid-Air,* seemingly suspended halfway up an enormous cliff face. Shanhua and Huayan monasteries are excellent examples of architectural and religious statue styles of the first and second centuries.



Yurt and earth house, seen with concentrator solar cooker and wind generators at an experimental energy project on the Mongolian Grasslands.

We arrived in Hohhot, the capital of Inner Mongolia, early in the morning. After breakfast our first destination was the Sports Institute, where we were introduced to our bikes. Arrangements had been made by Tailwinds Bicycle Touring, organisers of this first cycling trip to Inner Mongolia, for specially prepared lightweight 15-speed all-terrain bikes, which proved to be perfect for the roads we encountered.

Roads is perhaps an overstatement. Tracks, complete with washouts, corrugations that tested the resilience of all our behinds, sand drifts and dry river beds, mud, rocks and open grasslands is a more complete description. It all made for exciting cycling and we faced the challenge calmly. Our group ranged widely in age and cycling experience, but we all found that with the right bikes all the rough riding was rewarding.

To familiarise ourselves with the bikes we set off on an escorted tour of Hohhot city. An escort was needed as we swerved and jostled our way amidst the seemingly endless streams of local cyclists. The curiosity of the Hohhotites towards 16 Australians on strange bicycles was an obvious recipe for bicycle traffic jams and congestion.

Hohhot is at 1,000 metres and on the edge of the Mongolian Plateau. A long uphill trip over the Daqing Mountains takes you to the true Grasslands, rolling green hills that stretch away as far as you can see. Sprinkled over the green, like crumbs on a carpet, are small flocks of sheep and goats, still the mainstay of the rural communes and the lifeblood of many Mongolian families.

Mongolians make up about 20 per cent of the total population of Inner Mongolia, but up to 90 per cent of the herders. Traditional nomadic life is slowly fading as improved agricultural and husbandry methods are introduced. It is a curious process because many of the better known aspects of Mongolian culture remain intact.

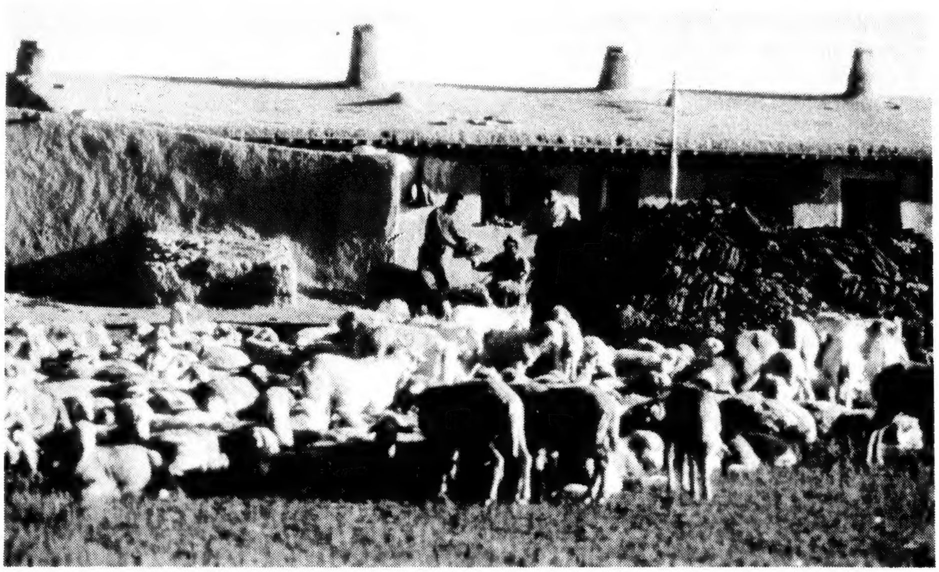
Yurts, called *mongolbau* by the Mongolians, are still in use. These unique shelters have intricate wooden frames wrapped by layers of thick felt and are portable and easy to move to new grazing lands. They are comfortable in the summer months as well as in winter. A small earth stove is used for cooking and heating. We were lucky to have had 'a yurt experience' and were impressed with the cosy comfort of these ancient dwellings.

Mud houses in various styles are dotted in small groups over the Grasslands. They may be circular, domed, square or cut into the hillside, alone or in small groups. They seem stark outside, but inside? One of the virtues of cycle touring is being able to stop whenever you wish, whereas with a bus or train many chances to explore flash by, lost forever. It wasn't long before our curiosity overcame our shyness as individually we approached these brown islands in the green grass sea.

We each took away a similar tale of friendship. A welcome bowl of Mongolian tea was offered as we were shown into the compact and orderly room. These neat interiors were decorated with posters of far off places in China, with the occasional national hero adorning the wall beside the calendar and above the radio. The single room houses reflected simple but comfortable lifestyles. Our hosts produced numerous bowls of a variety of goat and sheep cheeses, yoghurt, salt, fried breads, seeds and some foods we could not identify.

We had been warned about Mongolian tea and here it was! There is a ritual to it, as goat or sheep milk is mixed with tea, salt, sugar, yoghurt, butter and, if you like a little extra, millet seeds. The original meal in a cup. While drinking you pick at the servings of cheeses and fried breads. The hospitality was hard to refuse and the snacks were delicious.

Our group was fortunate in that the route we followed is only available for cyclists. We felt privileged and elated, exited about whatever was in store for us. The towns don't rate a mention on any map we could find. They are very small, with two shops, mudbrick build-



ings, often a protective town wall, one dusty main street and hitching rails for donkey, horse and camel. These little Mongolian towns bear almost unpronounceable names like E'erdun-'aobao, Zhaohe and Wangfuerdui. Each, however, has its own character and people who offer genuine expressions of welcome that make you feel immediately at ease.

Hongger'er, situated on a river bank with rocky outcrops as a backdrop, was a contrast to the rolling hills and dry river beds that effectively bogged bicycles and support vehicle alike in the previous days. It is an ancient religious town with two Buddhist monasteries. Though much damage was done during China's Cultural Revolution (1966-76), the Tibetan texts and religious artifacts were hidden and the lamas were protected by the community. Restoration is in progress and the old lamas are teaching again, but officials point out that there are no new monks. The presence of pilgrims, young and old, relaxation of controls on religious expression and the persistence of strong traditional beliefs has led to a new lease of life for many ancient religious sites.

Watching the setting sun near Hongge'er, as the last remains of the day crept out of the calm and beautiful town below and the surrounding valley and mountains covered with soft hues, I felt that this was it. We had reached the part of Mongolia we had sought after.

The small towns opened their doors to the foreign visitors. After meeting the welcoming committee we were shown our accommodation, usually four single beds with hard mattresses and cotton quilts with elaborately embroidered silk covers. Each room had a dirt floor, an enamel wash bowl and the thermos, always full. There were no first-class facilities, but it was great . . . Mongolia as it is! Escaping from the mainstream is one of the rewards of cycle touring. One comment I remember was, *"It's like trekking on two wheels"*.

Our visit was a big event for the community. It was an opportunity for a banquet with Mongolian folk songs (to which we were expected to respond) folk dancing, speeches and toasts with that fiery 140-proof liquor *Maotai*. Be warned. Beware the inexhaustible host who knows but one word, *ganbei*, to which another round of Maotai is expected to pass down your tortured throat.

Chinese food is known the world over for its variety and great taste and Mongolian food for its basic ingredient, mutton. Our tables bore a great variety of the vegetable dishes in season. Delicacies appeared from nowhere, but it wasn't hard to guess where the huge bowl of boiled mutton came from. Baked leg of lamb and the famous Mongolian hotpot were treats.

To be honest, I had anticipated a great deal of monotony when I first envisaged a cycle journey through the Grasslands of Inner Mongolia. Far from it. The rolling countryside, a huge green, treeless expanse, was a land of contrasts that could be serene one moment and fierce the next. It seemed as far removed as possible from all the familiar images of China.

The *grass* is in fact a mixture of a huge variety of small flowering plants, aromatic herbs and some grass. The fat tyres of our bikes triggered the release of delightful aromas from the herbs and we realised why the Mongolian mutton is so tasty. The Grasslands support flocks of sheep, goats and camels and the herders depend on their animals. This country had bred a class of horsemen respected the world over and was once the centre of the largest empire in the world.

Sadly, all good things end. Reluctantly, amidst scenes of rebellion, we returned our bicycles to their caretakers, inwardly happy, knowing that we had experienced a rare part of the world. It was time to return to progress and cities far away. We felt richer, having enjoyed the vast open landscape of the Mongolian Grasslands and the open friendship of its people.

Cycling China

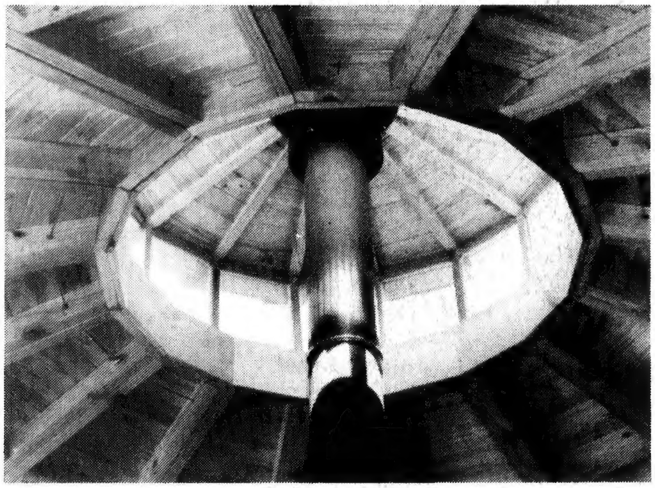
Robert Fletcher was the leader of the first group from Australia to make a bicycle expedition in Inner Mongolia. The trip was organised by Tailwinds Bicycle Touring, which is planning more adventure cycling vists there.

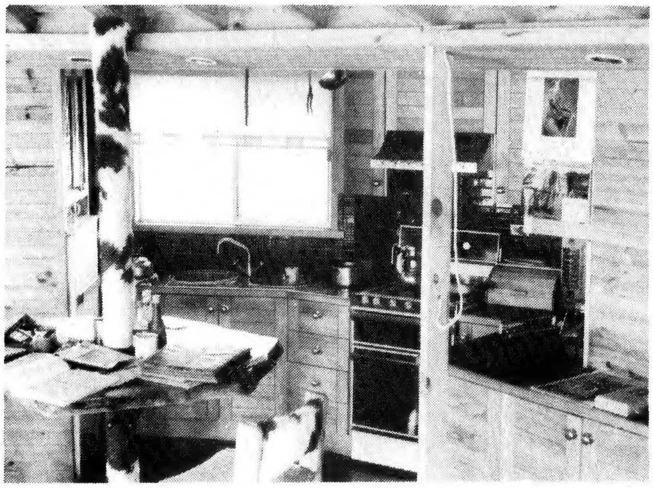
"Apart from the beauty of the place," Robert says, "my lasting impressions are of mud houses, felt yurts, a livelihood based on sheep, goats and camels, with traditional clothing based on the skins, hair and fur of the animals, including Ugh boots made from dogskin".

Write for details and a programme of regular China visits, with cycle tours based on Guilin and Guangzhou (Canton), and also bike trips in Japan.

Tailwinds Bicycle Touring, GPO Box 930, Canberra, ACT, 2601. Phone: (062) 41 6413.

NOW IT'S THE AUSSIE YURT





The traditional yurt of hide and felt, circular, portable and easily assembled, was for centuries an ideal shelter for nomadic Mongolian Shepherds and their country's climate. These round houses are still preferred by many people settling down to live in one spot in Mongolia today, as Robert Fletcher relates in the preceding story.

The Gunningbar Yurt uses the same basic design and achieves the same feeling of symmetry and space when adapted as a multi-sided timber building to suit Australian conditions. The timber makes it solid while the modern yurt uses cables (rope in the original) to incorporate the extra strength of the ring compression principle.

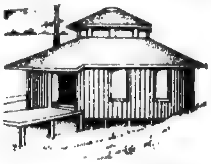
Yurts can be erected quickly and easily to serve as a first home base, studio, office, storeroom, music room, schoolhouse or meditation hut in the bush or in a suburban backyard. Wall and roof are built from modular pieces fitted together like the spokes of a wheel. Single yurts can be joined together in groups using an annex, or two may be joined as a distinctive two-storey tower.

People say yurts are nice to live in, full of light and unexpectedly spacious inside, while blending in with the environment outside (the rafters are strong enough for a sod or herb roof). The 4.6 metre diameter yurt, for instance, is 16.35 square metres or 176 square feet in area inside while the 8.5 metre diameter yurt is 58.34 square metres, or 628 squrare feet in area.

"One can carve out one's own personalised atmosphere in a yurt", says Mike Shepherd, proprietor of Gunningbar Yurtworks. "No two Yurts are the same in the whole of Australia. We have constructed 76 yurts so far since I started the business in Canberra in 1980."

If you go to look at a yurt at Gunningbar, you can arrange to stay overnight in one on Mike Shepherd's sheep farm in Grabben Gullen Road.

You can build your own yurt from a kit or have one erected by Gunningbar Yurtworks, who also offer for a fee to draw and submit plans to your Council.



Up goes an Aussie yurt.

Opposite page, top left: Mike Shepherd and his team from Gunningbar Yurtworks erected this yurt in four hours flat for the Channel 10 Sydney Good Morning Australia TV Programme. Top right: Cable is threaded through roof eaves overhanging the window.

Below left: Roof cupola with stove chimney seen from inside the yurt.

Below right: How it looks inside when fitted with a cosy kitchen.

Below: A frame kit fully erected (left), ready for cladding by the owner builder and (at right) a completed yurt with cupola and fibreglass compound shingles.

COMPLETE YURTS

Gunningbar Yurts are made in 4.6m (15ft) diameter, 5.1m (16ft) with annexe available, 6.1m (20ft), 8.5m (28ft and there are also tower yurts. All come in standard, contempory, or deluxe styles at prices which depend on the quality of the timber used in their construction.

Prices for the 4.6m yurt, for example, are $7,500 deluxe, $6,000 contemporary and $5,000 standard, with $350 extra for a rooftop cupola. A 6.1m yurt runs at $12,100 deluxe, $10,500 contemporary and $9,500 standard with annex $1,600-$2,000 extra and cupola $400 extra. These prices include labour and materials such as aluminium windows, insulation, door and roofing, for a yurt erected on flat, accessible land. Plumbing, draining and wiring not included.

YURT FRAME KITS

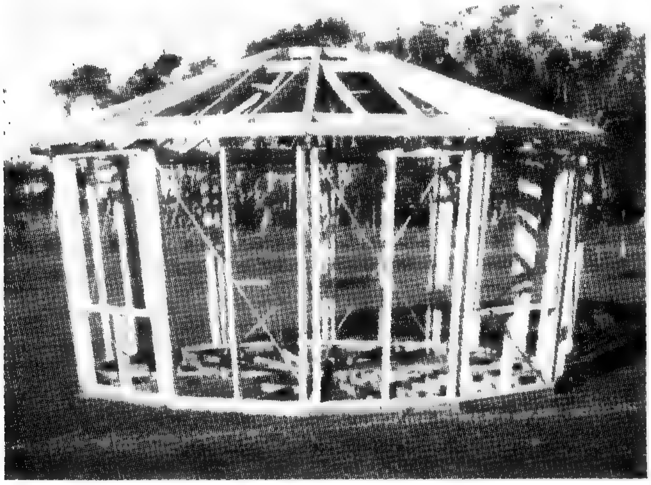
Ready to build kits made up of modular units which join together to form the complete yurt frame and can be assembled in a couple of days by one person using basic carpentry skills. An instruction manual is included with details of construction and suggested cladding materials and techniques. Kits are sent by rail freight (extra charge) anywhere in Australia.

☐ 4.6m (15ft) diameter, with 12 roof frames and 12 floor frames of dressed radiata pine or spruce, $1,900. Includes triangular floor frames, floor joists, antcaps, cables, strips, gang nails, coach bolts and nails and an acrylic skylight bubble dome.

☐ 6.1m (20ft) diameter, with 16 roof frames and 16 wall frames of dressed radiata pine or spruce, $3,200. Includes similar materials and hardware, but no skylight.

For further information write to:

Gunningbar Yurtworks,
Gunningbar, Goulburn, NSW, 2580.
Telephone: (048) 29 2114



Water wheel pump

By Robert Martin

I would like to share with readers the success story of my alternative water pumping system, which consists of a 3-metre diameter water wheel driving a 5 inch x 3½ inch piston pump. As a backup system there is a **Billabong No. 10** hydraulic ram pump.

Both are pumping to a storage dam 150 feet above the creek and 100 ft above the dwelling, which gives over 40lb of pressure to the taps and sprinklers.

The farm, of 85 acres, just outside Ravenshoe, North Queensland, is bounded by South Cedar Creek on three sides. When I purchased the farm in July, 1978, it came complete with a 20 horse power (HP) **Lister** diesel engine and centrifugal pump, which was skid mounted. This was, as the previous owner said "to prevent the unit from washing away in the Wet." Rather a rough setup, I thought, so that one of my first jobs entailed moving the pump to higher ground and placing a shed over it.

My plan was to set up a totally organic farm in tune with Nature, using no poisons and to try and grow as many species of fruits and vegetables as possible in this climate at 3000 ft above sea level. It must be realised that while we are geographically within the tropics, the climate is temperate and we have red volcanic soils.

By 1982 my fuel bill was $1000 per year, so it was time to look at installing an alternative, more economical system of water supply to cover all farm needs. I had heard about a No. 10 hydraulic ram pump (the biggest they make) lying in a creek bed at Rawson's Pool in the Millaa Millaa district and this proved to be correct. The price of $300 was agreed upon. This was a windfall for me, as new prices at this stage of my venture were prohibitive. Recovering the pump was a challenge, but "nothing ventured, nothing gained."

Some days later we had the ram and all its bits and pieces sitting in my shed and a complete rebuilding job was commenced. The brass shaft was replaced by a stainless one and Teflon washers added to prevent metal contact. This has proved to give much longer life to these working parts. As I was choosing the creek site to position the ram, I was mindful also of installing a water wheel at a later date, which would utilise the overflow water from the dam we proposed to build.

After a year of procrastinating, my father and I finally commenced operations in the Dry season of 1983, knowing that it had to be completed before the Wet season (normally November to April). We started laying the 4 inch cement pipes in the water flow which was then about 4ft wide and 1½ inches deep. The solid rock creek bed at this spot needed to be roughened with a rock pick to allow the cement to bond the set of 10, 4 inch pipes to this rocky creek bed. For any dam over 2ft height it is a good engineering principle to drill the rock base and insert steel bars to strengthen the dam wall. These 10 pipes were adequate to allow for a sudden downpour and any consequent runoff.

We next used papier-mache to plug the spaces around the pipes on the intake side and ended with 99 per cent of the water flowing in through these 3 ft pipes. A good 4:1 cement mix was used to cement all around the rest of the pipes of the bedrock and levelling across the top of the pipes. When this was set we then had a dry base on which to construct our dam. The dam was needed to gain extra height of fall for the intake pipe of the ram pump system and also to provide the overflow water down a water race to power an undershot water wheel.

Note here that you must gain permission for constructing a dam on a watercourse from the Water

Resources Commission (in my case at Mareeba). The inspectors were most help and considerate and a licence was granted for a charge of $40 per three years.

The dam base (the 10, 4 inch pipes) could now be extended between the creek banks which were 75ft apart. It took us many trips to Tolga to pick up "seconds" in Besser blocks, and over 30 bags of cement used in the construction of this dam wall. My father's main advice was "Use a lot of cement — you don't want it to wash away." I heeded his advice and made sure that each batch of cement was up to his standard. The dam wall is 3ft thick at the base as we backed it up with loose creek bed rocks, strengthening it on the downstream side.

The 4 inch ram drive pipe was cemented through the wall approximately halfway up the wall and a good stainless steel intake strainer was fitted to the end of the pipe. The 30kg Billabong ram pump was mounted on a skid and towed to the ram site, 150ft downstream from the dam. The base for the pump was cemented in with 5/8th inch stainless steel hold-down bolts.

We had obtained a 13ft fall and had to pump to a head of 155ft. Hydraulic rams work on the principle of using energy or weight of flowing water to pump one gallon in every 10. A ram pipe fall of 1ft for every 10 to which water is to be elevated is recommended.

The big day came. After some false starts and air bleeding problems, the ram began to thump away. We measured a flow of 3 gallons per minute into the storage dam. This Turkey's Nest dam, as they are called locally, was made in four hours by a local master bulldozer driver for $400 (much better to me than spending thousands of dollars on cement or steel tanks). This type of dam is only recommended if you have non-porous clay on your hilltop.

After the initial celebrations of seeing water pumped with no motors, we realised that 4300 gallons per day was not near enough water to irrigate with, but it was certainly a good start.

The following year we decided to go ahead with the water wheel project. I had checked out all the libraries for information on its design, but to little avail — all I could find were the old-fashioned monsters of early England. I had worked as a marine engineer and had sailed from Australia to the Mediterranean in a 44ft ketch, during which time I had studied water flow, so I decided to design my own wheel using modern materials and the flow principles.

It was found that the maximum sized wheel I could use was about 9ft 2 inches in diameter, as axle height of an undershot wheel should not be above water height for best performance. I bought all the steel in Cairns — four sheets of 1/8th inch plate 8ft x 4ft and several lengths of 2 inch x 1 inch box section steel for bracing. While in Cairns I had Kenny Industries cut out the 33 paddles on their guillotine for nice straight edges.

My father was adding another layer of 8 inch blocks across the top of the dam wall, leaving out two blocks near one side for a 21 inch x 8 inch deep water race down to the bottom quarter of the water wheel. This race was 15ft long, including the pylons for the water wheel's main axle support. My father gave this work a smooth trowel finish for less water resistance. P.K. Engineering in Ravenshoe assembled the wheel, welding with a minimum of buckling so that it would turn true. A 2 inch stainless steel propellor shaft was found at Tonkin's scrap metals yard in Cairns, along with gate valves at about one-quarter of new price.

After considering all the moving parts in a piston pump, I decided to try a modern helical rotor pump, which is a reliable simple pump. The only drawback of this type of pump is that they need to run about 900 rpm to be of maximum efficiency. On paper it appeared that the wheel would put out about 4 hp, but I wasn't sure how much would be lost through the high gearing-up necessary. These things are so tricky because you will find that there are lots of "would be" experts in this field, but no-one with such a wheel in operation that lets it speak for itself.

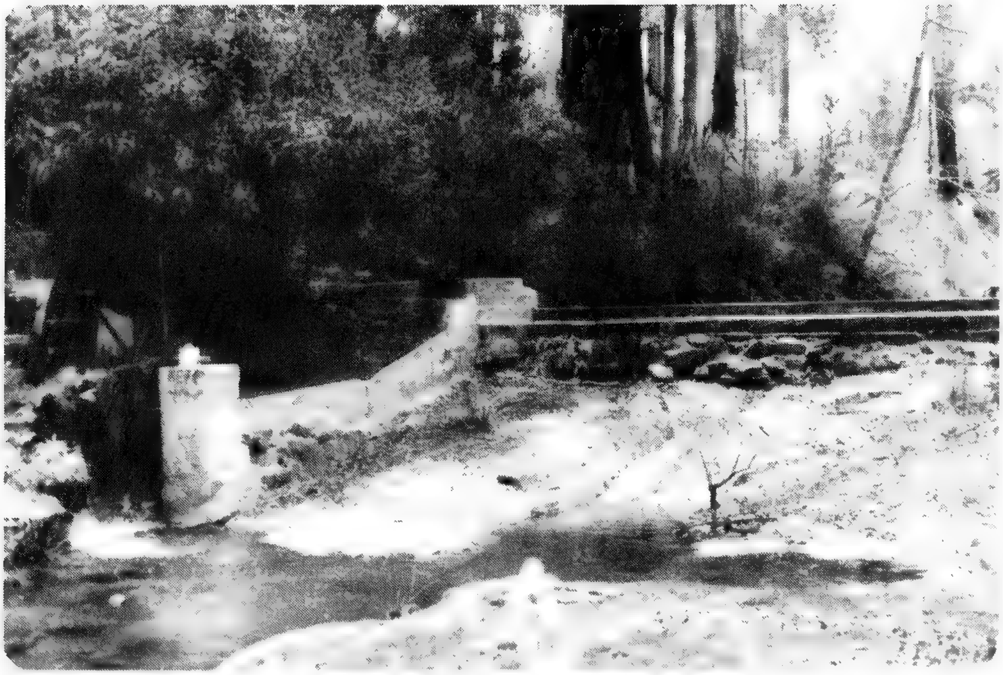
Another thing is that all pump HP requirements are quoted for electric motors and seem to vary from one manufacturer to another. Anyway, I decided to go ahead and bought an old 3 speed **Ford** gearbox, reversed it around so that it would gear up and fitted a "lay" shaft after a 4:1 step-up from the wheel. Oil wells were chipped into the concrete pylons, then fibreglassed to make oil baths for the gears to give long life. There was another 5:1 step-up from the "lay" shaft to the gearbox.

All the machining and welding of the water wheel construction ran into about $600 for labour and about $600 for materials, including the cement and blocks. The new 2 inch **Mono** pump cost $1100. These costs were more than covered when I later sold the diesel pumping plant along with the 4 inch aluminium irrigation pipes, which were replaced by 2 inch poly pipes connected to allow for 2 inch irrigation pipes and sprinklers.

Painting the wheel was quite a job, especially with thick **High Build** tar epoxy paint (great for rust-proofing, but the fumes got a bit heady for me). The day came when we rolled out the wheel from the workshop, just clearing the doors, and many helping hands soon had it aboard a friend's truck. It took 10 of us to carry it down the creek bank and lift it into place. All measurements proved correct as the roller bearings were secured down.

Next job was to make a mould fit of the cement underneath for about a quarter of the wheel diameter, so there would be no power loss from water flow-by. This was achieved by greasing a ¼ inch thick plywood board and fitting it around the base of the wheel contour, then cement was forced under to get a perfect moulded fit to the wheel

Turkey's Nest holding dam of about 80,000 gallons capacity. This dam was made in good holding clay in just four hours by a bulldozer driver.



The water wheel and easeway are located away from the main stream and possible flood damage in the Wet.

shape. The plywood was eased out when the cement was almost set. All edges were smoothed off. Also the sides of the water race were brought in about 1½ inches each, so as to direct flow perfectly into the buckets. Buckets were angled at about 30 degrees to assist this flow.

After several days, when the cement was dry, came the moment of truth. The crowd held their breath and the sluice gate was slowly raised. The wheel raced away and was timed at 33 rpm under no load. We replaced the gate, primed the pump and opened the delivery line, which we had joined into the hydraulic ram pump outlet line. Like a steam train starting off, it gathered speed. It was in top gear, which is direct drive (through the gearbox) and the wheel steadied at about 18 rpm, which was 360 rpm at the pump. We then shifted into second gear which slowed the wheel down to 10 rpm (now definitely under load) with pump speed at 400 rpm.

First gear actually stopped the wheel — so much for power loss when gearing up! Certainly this was with a tight rubber impeller pump and minimum water flow, but it did not look hopeful at all. After good rains the best performance was 350 gallons per hour. So back to the drawing board.

After quite a search, a friend offered to let me try his 5 inch x 3½ inch piston pump. The gearbox was by-passed and different sized V-pulleys were tried directly from "lay" shaft to the pump pulley. The revs of the wheel almost doubled under load to about 22 rpm, to 30 strokes per minute at the piston pump giving, would you believe, 500 gallons per hour at the top holding dam.

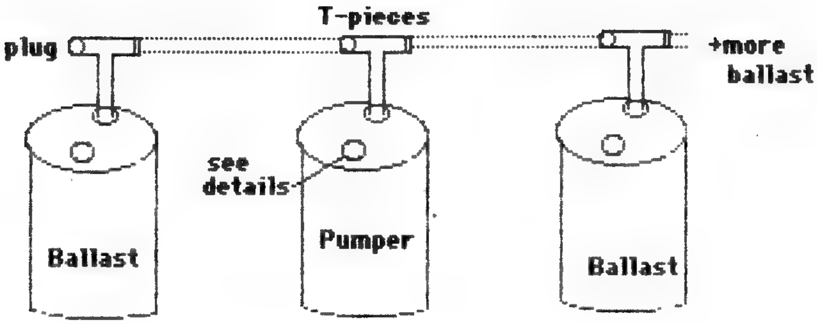
We were quite elated with this improvement and the capacity would increase as the creek (drive force) was to rise in volume. The Mono pump was swapped for the piston and we were both happy with the arrangement. I made up a set of chain drive sprockets for low, medium and high water flows (11, 15 and 19-tooth, with ¼ inch chain).

The record output to date is 40 strokes per minute at 760 gallons per hour after some good rains, but we don't need the water then! There are many times when we can shut the water wheel down by closing the sluice gates and get by with the water from the ram pump.

The saving on fuel and maintenance costs so far are well over $1000 per year and the wheel has proved perfectly reliable. Even the leather buckets in the piston pump are still in good shape after 16 months of running, due to good intake screens and clean mountain stream water. The dam has proved to be a great swimming spot and there is nothing quite like watching the wheel for meditation as I contemplate my next project . . . power generation.

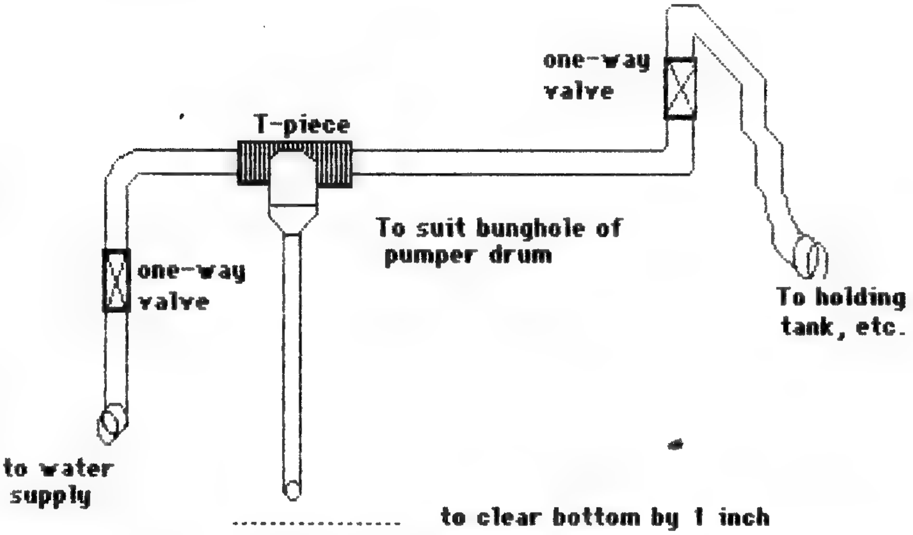
Where the water goes. This garden of about 1 hectare is fully irrigated at a pressure of 45 lbs per square inch.

The sun-pump



The sun-pump is a simple passive solar device which moves water without using any mechanical motive power. It is made from recycled oil drums, a few one-way valves and pipe fittings. The energy of the sun does the work.

The principle is based on Boyle's Law, formulated by Robert Boyle in 1650. Boyle showed that if a gas (air in this case) is pushed into a smaller volume the pressure increases accordingly.



By Andre A. Maertens

We have all heard oil or fuel drums pop in the heat of the sun and again at night when it is cold. The heat causes expansion of the air inside the drums and the cold causes the air to contract.

This prompted me to make a few tests. I got up to 8lbs of pressure from a 12 gallon drum from painted matt black and using sisalation as a background reflector.

The vacuum on the suction cycle was 2.5 inches of mercury, this on an average day. On an overcast day or cold day those pressures will of course be smaller, while in heatwave conditions they will be higher.

Here in Queensland we have a lot of sun and also a lot of evaporation. The system described is ideal for trickle irrigation. A little experimentation will tell you the suction depth and pumping head in your area. I would suggest siting the assembly as near as possible to the water supply (creek or dam) so as to fill the 'pumper' as much as possible.

For materials scrounge, beg, borrow or buy:

7 x 200 litre drums without leaks (dents okay).

2 x one-way valves.

Black poly pipe and fittings (sizes to match drum bungs).

You will need enough polypipe to make suction and pressure lines. I suggest using the small holes in the drums. That way the fittings will be cheaper too.

The sketch of the installation shows just three drums, that is two ballast and the pumper.

All fittings should be either galvanised or black poly. Thread tape should be used on all fittings. The one way valves can be purchased from any pump suppliers.

When the whole system is assembled check for leaks using soapy water around the fittings during the pumping stroke (midday). Bubbles will show any leakages. Tighten those fittings a little more.

Once all is in order, paint all the drums matt black with two coats. The sun-pump should be located in a protected area and facing north.

A light fence about 4-5 ft high to support the reflector should be erected 3 feet to the south of the drums. Paint the whole fence silver or cover it with sisalation. The reflector will redirect the sun's rays toward the rear of the drums. Use very dark sunglasses when doing this work and wear trousers and long sleeves or you will get sunburnt. I know by painful experience.

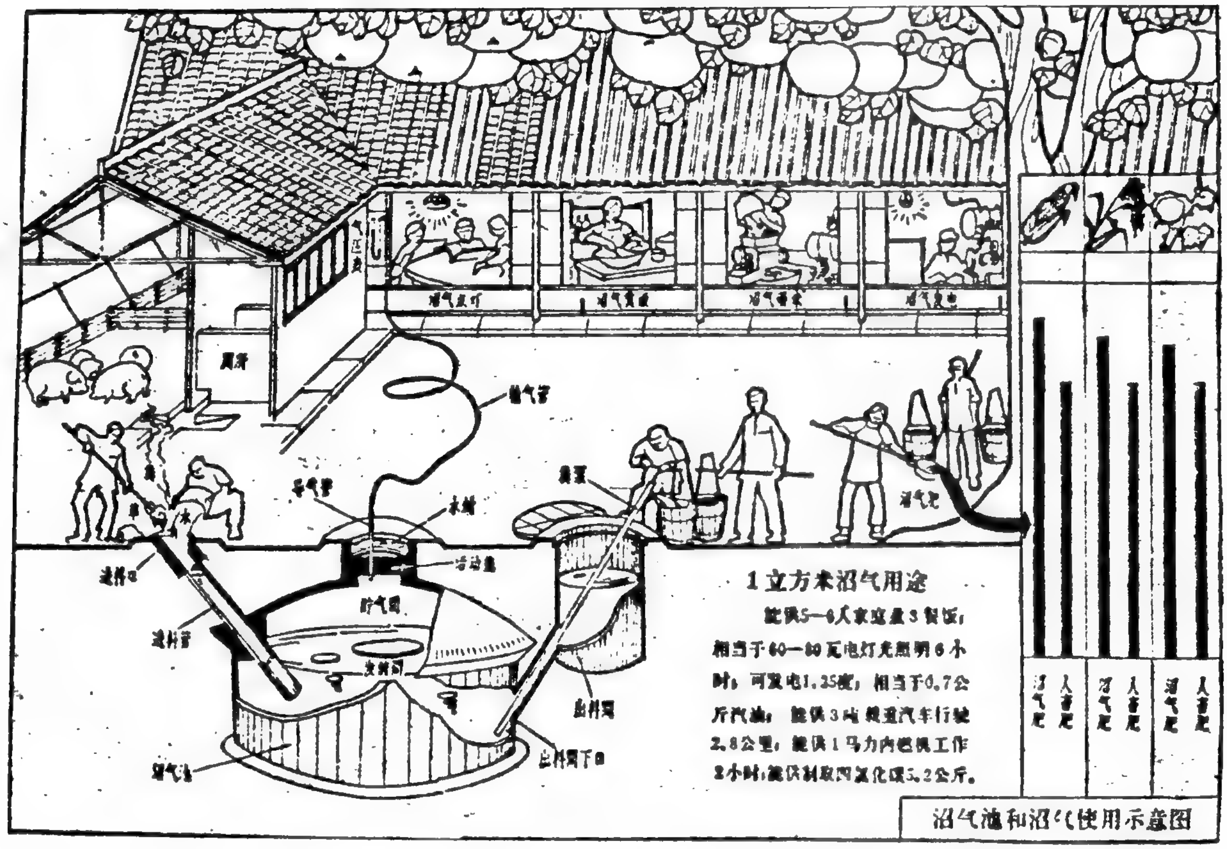
The pump will start working in 24 hours. From then on it will go on by itself until rust eats a hole in one of the drums or it springs a leak in the suction side. Increased pumping can be obtained by adding more drums and/or adding 2 litres of petrol (alcohol is okay too) to the ballast tanks. **No smoking anywhere near the installation or outlet.**

There you have the basis of a fully automatic pump that is relatively cheap to build and costs nothing to run. It is also self-adjusting, pumping more on hot days and less on cool or cold days.

I had a small prototype version of this design, using three 12 gallon drums, working in our fernery. It was not fully automatic as I had to fill a reservoir first. We don't live near a creek, nor do we have a dam and as we have water reticulation and no restrictions or metering, it is not in use, but all the parts are in our shed.

As I have not built a full-size sun-pump installation, I would appreciate photos, reports or comments on your plant. If you have any further queries, I would be pleased to help.

Andre A. Maertens, 7 Elizabeth Street, Gympie, Qld, 4570.


1立方米沼气用途
能供5—6人家庭煮3餐饭，相当于60—80瓦电灯光照明6小时，可发电1.25度，相当于0.7公斤汽油，能供3吨载重汽车行驶2.8公里，能供1马力内燃机工作2小时，能供制取四氯化碳3.2公斤。
沼气肥
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沼气肥
人畜肥
沼气肥
人畜肥
沼气池和沼气使用示意图

Methane in China

By Ron Haines

Some 800 million people in China live outside the cities. Today around 80 per cent of the energy used in rural households comes from plant stalks and firewood. Although more than 400 million tons of stalks, straw and firewood are burned annually, about half these country homes lack fuel for three months of the year.

China is rich in fossil fuel resources such as coal, oil and gas, but priority in using these is given to developing industry, while communication and transportation in the countryside is poor. To cope with this fuel problem, great efforts have been made to research and use methane, a biogas.

Methane is an inflammable gas, produced by the fermentation of organic matter such as plants and human and animal wastes. A cubic metre of methane is equivalent to 2,250 gms of coal in calorific value.

Luo Guorui, a native of China's southern province of Guandong (Canton), who built a hydraulic methane tank in the early 1930s was the first Chinese to promote the use of the gas. Since 1949, methane production has advanced rapidly. Today there are 7 million methane producing pit digesters or tanks in the countryside, capable of yielding 2 billion cubic metres of gas annually. They provide energy for 6 million rural households.

Most digester tanks are owned by individuals. With a volume of 8-10 cubic metres, each tank can produce 1-3 cubic metres of gas daily, enough for cooking and lighting for a family of four. The tanks are simple to build and materials for their construction are readily available.

There are some 2,000 community owned tanks in China which are used to power electric generators, pumps and grain and fodder mills. In addition, there are about 36,000 medium-sized tanks, with volumes ranging from 50-1,000 cubic metres. Some of these are used to dry farm produce and heat greenhouses, while others are used to make chemicals.

In some small towns and cities, methane systems are being used to protect the environment by converting organic wastes from industry into reusable energy.

Methane production helps to improve sanitation in rural areas. Since 95 per cent of the eggs of parasites in the biogas tanks can be destroyed by fermentation, the system is useful in wiping out hookworms, snail fever and leptospirosis which are common in the country. Residues left in the tank serve as organic fertiliser. A 10 metre tank can produce a tonne of fertiliser in a year.

Government assistance, both financial and material, is avilable to the Chinese peasants who wish to build their own methane systems. Despite the language barrier, the illustration of the production and use of methane, from a magazine I obtained on a visit to China, shows how uncomplicated the design of biogas digesters can be.

☐**A Chinese Biogas Manual** (ITDG), reviewed in **Earth Garden No 34**, our special China issue, is still the best source of information on working methane plants, especially those in Sichuan province.

low voltage safety

In **Earth Garden 46** (page 48), Michael Hancock suggests that mixing low voltage DC and 240V AC can be lethal. He is correct.

I'm not sure that his suggestion that people go to an electrical wholesaler is the best solution. It would be a much better idea to contact a member of the **Appropriate Technology Retailers' Association of Australia (ATRAA).**

These people, unlike electrical wholesalers, are familiar with low voltage DC equipment, the cable sizes required for it to be safe, etc. They know that batteries are potentially very dangerous. They are aware of damage that can be caused to inverters and other equipment if certain precautions are not taken.

It is certainly a good idea to have 240V household wiring undertaken by a licensed electrician, but even there safety cannot be guaranteed. When using the mains electricity grid or a generator a fuse blows when a short circuit occurs. With an inverter (unless it is a very large one), the fuse will not blow; there is not enough power. The inverter will usually go into overload. Some inverters switch off, others don't but continue to provide limited power. With no 240V appliances working, a normal person would be entitled to assume there was no power, make some adjustment — **and be electrocuted** — because the inverter is in limited power mode.

Members of ATRAA meet regularly and discuss just these issues. They know the sort of traps that people can fall into either because they have fallen into them themselves or because their customers have. Their experience is based on a wide range of installations in all sorts of situations. I believe they have a lot to offer, but don't expect free advice. Their knowledge, like much of their equipment, is very specialised and not available elsewhere.

Yours sincerely, Andrew Blair, Outlook Alternatives, Oxley, Victoria.

ATRAA MEMBERS

Going Solar, 320 Victoria Street, North Melbourne, Victoria, 3051. Stephen & Cathy Ingrouille. Phone (03) 328 4123.

Leven River Traders, 54 Main Street, Ulverstone, Tasmania, 7315. Greg Matthews. Phone: (003) 25 4884.

Survival Technology, 66 Maroondah Highway, North Croydon, Victoria, 3136. Tony Stevenson, Lynn Dean. Phone: (03) 725 5550.

Natural Technology Systems, 120 Prospect Road, Prospect, SA, 5082. Sandy Pulsford, Rob Hall, Allison Newton, Tony Wilson. Phone: (08) 44 7298.

Outlook Alternatives, Greta West Road, Oxley, Victoria, 3678. Andrew Blair. Phone: (057) 27 3261.

South Coast Energy Centre, 39 Queen Street, Moruya, NSW, 2537. Paul Downes, Dennis Ponte. Phone: (044) 74 2033.

Blue Ridge Solar, 8 Nullum Street, Murwillumbah, NSW, 2484. John and Maureen Cooper. Phone: (066) 72 4033.

Self-Sufficiency Supplies, Cnr Forth and Clyde Streets, Kempsey, NSW, 2440. Brian England. Phone: (065) 62 7704.

Alternatives, 37 Bangalla Street, Torwood, Qld, 4066. Adrian & Jutta Hogg. Phone: (07) 371 6994.

Low voltage plugs and sockets

To quote John Egan, from Compuro, Lismore: "There are specifically designed connectors for use with extra low voltage equipment. The connectors are polarised so that it is just about impossible to fit them into 240V connectors (though almost anything is possible if the sledgehammer is big enough!)

☐ From Compuro, shop 2, 1 Carrington Street, Lismore, NSW, 2480 and other Compuro home computer supplies stores (recommended prices).

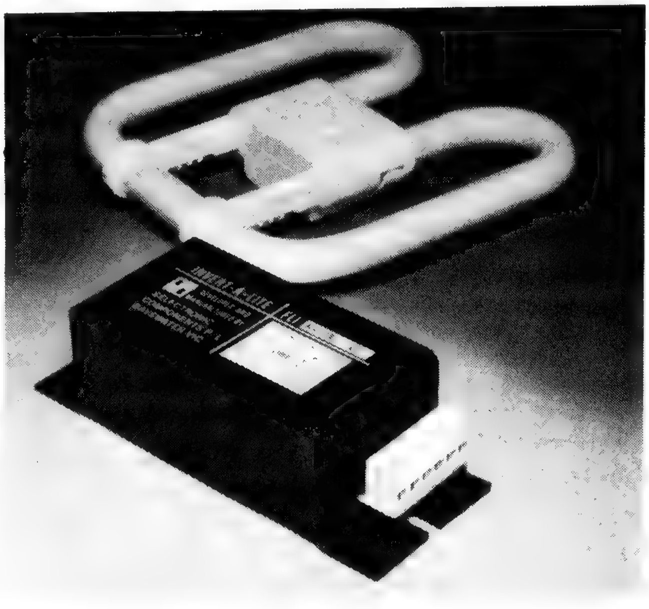
LV-402001: Two pin surface mount sockets, $4.79.
LV-438003: Two pin cord extension socket, $5.61.
LV-492002: Two pin plug top, $2.63.

INVERT-A-LITE

Invert-a-Lite is a compact 16W inverter which allows 16W 2D fluorescent lamps to operate from a 12V or 24V power supply for caravans, boats and low voltage home energy systems.

A 17W input produces a light output similar to that of a 75W incandescent lamp and no ballast or starter is needed. 2D lamps may be fitted to most standard lamps and light fittings.

The inverter measures only 125 x 47 x 38mm and was designed and manufactured by Selectronic Components Pty Ltd of Bayswater, Victoria. The Invert-a-Lite range now includes 8W, 10W, 13W, 30W and 36W models, all in 12V or 24V versions.



Selectronic's 16W Invert-a-Lite with a 2D fluorescent lamp.

SOLAR ELECTRIC SOURCES

South Burnett Solar Power Systems, 31A Fitzroy Street, Nanango, Qld, 4315. Agents for Solarex, Tideland (BP Solar), Dunlop Batteries and Kirby Solar Trackers, low voltage electric and gas refrigeration.

Keeping animals without cruelty

We should be able to keep our domestic animals without being unnecessarily cruel to them. "To see a neglected animal in an awful paddock is very sad," says Armin Ptak. His story will help you decide whether or not *you* are suitable to keep donkeys, goats, sheep and other livestock — so it will help both people and animals.

Armin, who runs The Roaring Lion Donkey Stud at Undalya, near Auburn, South Australia, has written many articles for Earth Garden, including *Donkeys at work* in EG37 and *The story of Sage and Lilly* in EG43.

By Armin Ptak

While many people refuse to be sentimental about their animals — and have their reasons for their attitudes — I am ashamed to cry for them, to love them and even on some days to curse some of them.

As a city boy at the age of six, I was suddenly transferred to the country and farm life, a move which influenced me for the rest of my life. The farm I lived on was situated in Silesia, now Poland, and the attitudes of the farming community there were rather basic. Most animals were treated with little feeling and very little respect. They were fed, but not looked after too well.

Dairy cows were kept in their barns all year round. When the cows had calves the poor little things were slaughtered in the barn in view of their mothers. I remember giving the cows their first grooming in many years. Even little hands can do something good, though they can also do bad things. I remember how I slaughtered frogs during playtime to be like an adult. I even cooked them in the oven. Hens, geese and ducks were always killed in view of all the inhabitants of the farmyard. Before I was eight I had learned to do all that.

Then one day at school, a story was read out about the old man who understood the language of the birds and animals. It only opened my eyes just a little to learn that animals spoke and had feelings. I admit that I still imitated the adults for some time as the general notion was that animals were so much below humanity. As I grew older, I realised that animals have any feelings that we humans have and that it was nice to understand them and communicate with them.

When you go out to buy animals you might discover that they have hearts and minds too.

Usually what is called 'the man on the land' has not much time for tender considerations about his 'livestock'. I see truckload after truckload of sheep, pigs and cattle go past on the highway here with the knife awaiting most of them. Dare to look into the eyes of these animals to inquire about their feelings! They look most unhappy, suffering the last dislocation and pain of their lives. How tough, how hardened must I have been to participate in the game of supremacy which humanity is playing.

However, farmers as meat producers are confronted with a lot of opposition to their trade. Even the butcher's tender heart is bleeding with so many people beginning to shun his meat.

Should we run off now to save all the animals from slaughter? I do not agree with the attitude, however touching it may look on the surface.

Very few of the animals in the abbatoirs trucks would suit an animal lover or alternative farmer. Before we go to buy any animal, we should consider what we really want, need and can keep. Animals are not toys or statues, they are alive and have their own needs. If we fill our acreage with a mob of crossbred goats or with sheep growing an unwanted type of wool, one day we will find ourselves wanting to change to something more useful for the same amount of feed and labour. If we decide to hang on to our animals we will always know that they made it hard for us to acquire what we needed.

We must not run off to save the world. We will never be able to convert all humans to different lifestyles. The slaughter will go on. What matters is what happens in our small part of this world where we are in command.

There are many people who stock their few acres with goats, coloured sheep, cows, horses or donkeys. While all the animals are loved, or were once intended to be loved, are they after some time really in harmony with their owners?

A lot of people go out and buy on the spur of the moment. They find the animals so sweet, though they have no previous experience with them and have not bothered to read about them. Most of these people are disenchanted with their animals very soon. Some animals can be very difficult for a novice.

For the goat buyer, it is wise to remember that a goat will always manage to nibble at trees and also to waste a good part of the expensive hay. Any goat loves company and thrives on love, but will not perform without both. A person who has done nothing to understand that new goat, will quickly become uneasy with the acquisition.

Any animal in an environment so detrimental to it will not perform well. Mostly the owner will put the animal on the market again, or send it off to the butcher. The worst that can happen to any goat is to be bought very cheaply, or to be given away to heartless people. I regard only one way of buying a goat as right. First read about caring for goats and then go to a good stud and buy there for a good price. Stud owners are usually helpful with advice and mostly become friends when they see that the animal is well kept.

Another animal in grave danger with uninformed novices is the donkey. Unfortunately, people who don't inform themselves before they buy a donkey mostly try to get the giveaways and the very cheap ones. A start like that is most likely to end unhappily. As a rule in life you do not dispose of something cheaply which you value a lot. I know of many donkeys who are handed on and on and become even less likely to find an understanding owner.

A donkey with such an unhappy background needs special attention and training to develop a trusting attitude and be useful. That is hardly achieved by a beginner who has never read about donkeys and their needs. Even the most optimistic attitude can be quickly shattered when a resourceful donkey outwits its new owner.

The right way to buy a donkey is to first buy a book about the care and training of donkeys and to read it thoroughly. Then go to a stud and see what the donkeys and the breeder think about you. If all the donkeys run away from you, you could either be in the wrong stud where none is tame, or you could be the wrong person to own a donkey.

Donkeys are highly intelligent and judge any person on a very short time. If you are likeable, a tame donkey herd will come up to you and give you their approval, If they see that you have a weak personality and you are no match for them they will nibble you in a friendly but bossy way. Usually you can still get one who will accept your leadership, as not all donkeys have such strong personalities. The smallest donkey, by the way, is not always the easy one. Character is seldom related to size. When selecting our donkey ask the breeder for particulars.

Before selecting and buying you should have everything ready at home for your animal. Fences, gates, feed and shelter are essential. For company and help, you would do well to join the Australian Donkey Breed Society. You can write to the Secretary, John Kunde, 'Casita', Hazeldean, via Kilcoy Qld, 4515, or you can contact me at PO Box 102, Auburn, SA 5451. Most donkey owners need some advice and help at some time.

Even though cows are individuals and have their special personalities, they are more easy-going than either donkeys or goats. For any novice the steps I have outlined before are a must for cows too. Don't attempt to start with cows using only guesswork.

Horses are well catered for in all Australian States. Again you have to go through all the necessary steps to make sure you know your standing. Horses are intelligent too, contrary to the ideas of many people. They have more inbuilt fear than many animals, but that is a part of their nature and a reason for their great speed. It is advisable to join a horse eventing or breed society.

Smaller animals like poultry are also best taken seriously. It is amazing what hen and rooster will learn given an opportunity. Ducks and geese are delightful and clever at fulfilling various tasks. Get as much information about them as you can beforehand. Even though poultry are smaller than humans and feathered rather than hairy, each one has a heart just like yours and mine. We should respect them and live in harmony with them (I make an allowance for curses if they have raided the garden).

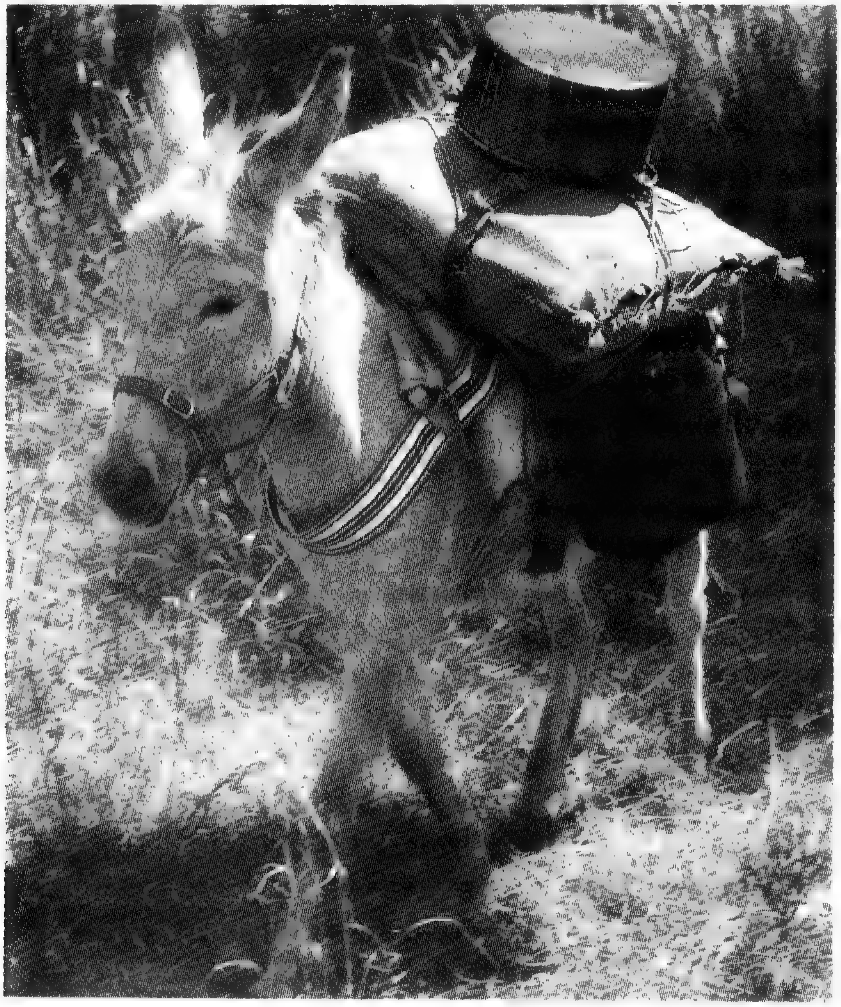
Goats, cows and sheep are animals who can feed us with their milk. They don't have to be killed for meat. The sheep provides us with wool for our clothes so we don't have to kill it for its skin. Poultry gives us eggs. All that is really marvellous.

Concluding, I would like to mention the pig, an animal held in low regard and kept for its meat. For people who have more than a few snakes about the property the pig can be the helper. Pigs eat snakes and survive snakebite well. Like the other animals, they provide manure for the garden and may even till the ground for the lazy gardener . . . however, I presume that Earth Gardeners are not lazy and have erected signs advising snakes to keep off the garden path!

BOOKS ON ANIMALS

This booklet isn't fancy. There are no glossy pictures and the drawings are pretty basic — but it contains all the information you need to 'get to know' and look after your donkey, presented in a way that children as well as adults will have no trouble understanding or putting into practice. This includes valuable hints on raising, feeding, hoof and teeth care, training, handling, emergency procedures, halters and saddles and companionship.

It is a thorough, well researched work by people who really know about donkeys, and extremely good value.



To own a donkey

Jenifer Simpson

Angus & Robertson Publishers, North Ryde, 1985, hardback, 80 pages, illustrated. Price $12.95.

For the investment of "a paddock (at least one acre), food, water, shelter, a small amount of care and lots of time", says Jenifer Simpson, a donkey will reward you with fun and affection, and will be a friend who will take you for a ride and do odd jobs around the homestead.

Jenifer Simpson, Secretary of the Queensland branch of the Australian Donkey Breed Society, has written this guide with knowledge and obvious affection, especially for tiny, hairy donkeys under 10 hands high. She stresses that donkeys should not be ridden until they are three years old and should not do heavy work until they are four.

Dozens of charming colour photos make it hard to resist donkeys (and that special mixture of children and donkeys together). The comprehensive text covers keeping, training and caring for donkeys as pets or children's companions and for their many ways of 'being useful', such as riding, driving, fetching, ploughing, pulling or carrying packs.

Introduction to Donkeys

Compiled by Pamela Davenport, Joy Kunde & Helen Lowing.

Australian Donkey Breed Society, Queensland, booklet, 20 pages, illustrated by Jenifer Simpson & Louise Hoole.

☐ Price $3.70 posted from: Secretary, ADBS Qld Branch Inc, Booloumba Creek MS16, Maleny, Qld, 4552.

Adequate food — both quality and quantity

There are people who buy a donkey because they have an overgrown block and they have been told that a donkey will 'eat anything'.

If a donkey is starving, then it will eat **almost** anything — they are great survivors. That does not mean the donkey is healthy.

A donkey, the same as any animal, needs more than 'junk food'.

The ideal situation is to have enough pasture grass to support your animal without having to use supplementary feeding. Native pastures are best and donkeys need a wider variety than horses. If this is not possible, the best supplement is **hay**, which will supply bulk.

Ensure that the hay is **good quality** — no dust, no must.

Grassy lucerne hay is preferable to pure lucerne. It should not be too green as it tends to go straight through the animal.

Barley must only be fed either boiled, kibbled or steam rolled — otherwise it could kill the donkey. **Do not feed wheat grain** — it could kill him.

If you have not a sense of humour and if you cannot laugh at yourself, then think twice about inviting a donkey into your life.

A joy of wild asses

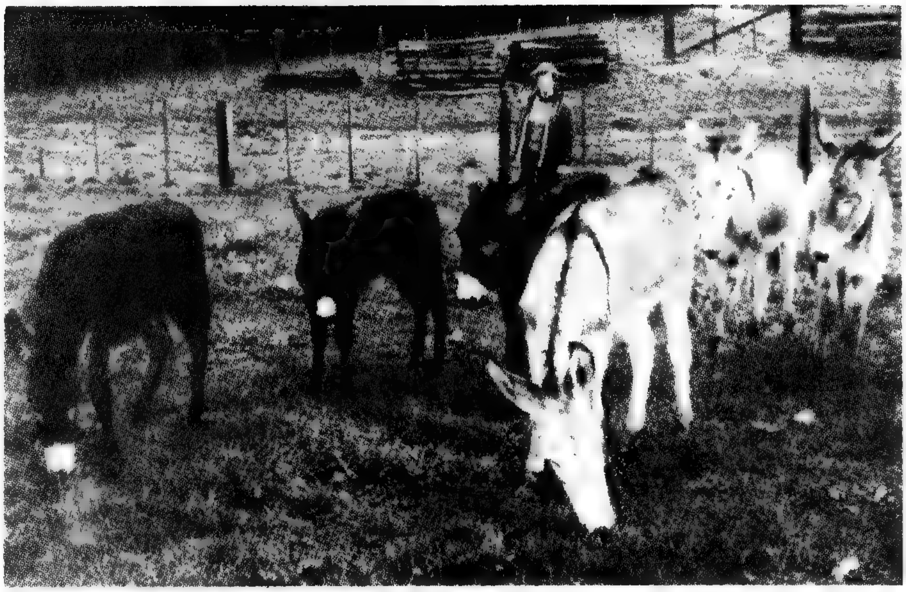
Ann Walker

Broomtail, Eaglehawk, Victoria, 1983, paperback, 56 pages, illustrated.

☐ Price $5.00, plus 75¢ postage, from The New Age Bookshop, Shop 35, Fountain Plaza, Bendigo, Victoria, 3550.

Ann Walker arrived in Tasmania from England in 1969 with the dream of starting a donkey farm, but there were no donkeys to be found! With much determination, she 'imported' six wild donkeys from the Northern Territory.

This little book tells the story of the six, who became the basis of the Keysoe Donkey Stud. It is a warm account of wild, uncared-for animals from the arid north, who became tamed pets living with people in a cold climate and a great attraction for kiddies' rides at fairs.



The original six wild donkeys at Keysoe. From left: Katey, Jason, Jane, Pete, Mandy and Sally.

Australian Goat Husbandry

Pat Coleby

Night Owl Publishers, Shepparton, 1983, paperback, 143 pages, illustrated.

☐ Available for $7.50 posted from Night Owl Publishers, PO Box 900, Shepparton, Victoria, 3630.

Mastitis, of which several different types affect goats, appears to be caused by an imbalance of magnesium and calcium in the diet. Victorian or South Australian dolomite fills the requirement exactly.

Vitamin C (Ascorbic Acid)

Vitamin C can be administered orally or by injection. It is indicated in any case where an antibiotic would normally be used; it can also be given to promote healing in injury and illness, for poisons, bites and shock, and as a buffer against stress when travelling.

For many years I have used massive doses with both humans and animals, without observing any adverse effects. In fact, it is impossible to overdose: if you are administering orally, diarrhoea would indicate the goat had had sufficient. (But, paradoxically, vitamin C will stop persistent scouring due to disease as well!)

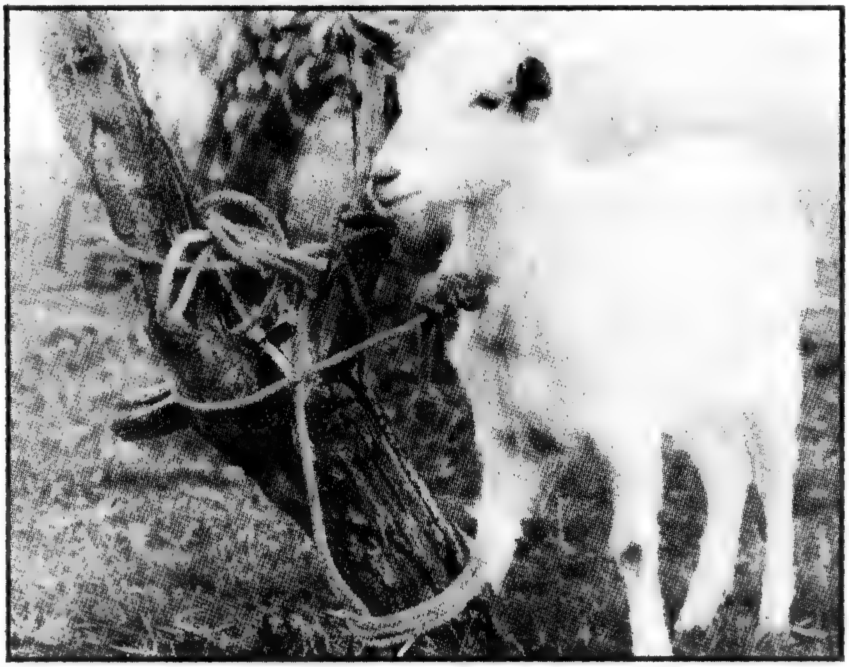
Calcium

This mineral is required by all animals and is normally found in herbage; unfortunately, superphosphate inhibits the uptake and a deficiency can occur even when stock are being fed an apparently adequate diet. Calcium should always be combined with magnesium as an excess of one will leach out the other. Dolomite provides an excellent assimilable form of both minerals and is preferable to DCP (dicalcium phosphate).

Pat Coleby's approach to goat keeping is based on maintaining animal health and good nutrition, the results of good management, breeding and feeding. Her natural methods have evolved from her own experiences while keeping dairy goats and farming without poisons for 20 years in Australia.

All aspects are covered, from how to choose a suitable breed, food and shelter, milk, meat, fleece, kidding, breeding and care of does. There is an excellent chapter on health problems with an A-Z of ailments, diseases and recommended treatments.

There are plenty of helpful photos and diagrams and it's nice to find sources at the end of the book which truly relate to Australia.



How *not* to tether. Use chain with swivels at both ends, attached to an iron post, running wire or wagon wheel; *never* use rope.

Breeding brown sheep

By Liz Lewis, Hahndorf, South Australia

Although genetically brown sheep have been known in Iceland, Russia, Europe and Africa for many years it was not until 1976 that Scott Dolling, a South Australian geneticist, identified a true brown sheep in Australia at a sale at Stockport.

This Merino ewe, a pale fawn brown, with a black lamb at foot was unfortunately later killed by a dog attack, but the skin still survives in Scott's possession.

At the 1979 Adelaide congress on **Breeding Coloured Sheep and Using Coloured Wool,** genetically brown sheep became known as moorits from the Iceland **moorutt** — 'as red as the moor', a term we heard used by Icelandic sheep geneticist Dr Stefan Adalsteinssen. This term has been adopted in South Australia to mean a sheep with genetically brown fleece, brown legs, face and hair, brown eyes, mauve pigmented mucous membranes of the mouth and brown hooves and horns.

A survey of South Australian flocks in 1980 showed that moorits were then represented in most hand spinning wool breeds of sheep — Lincoln, Border Leicester, Corriedale and Merino. Since then the 25 known moorit sheep population has grown somewhat as breeders have been selecting **for** moorit in their breeding programmes.

The South Australian Coloured Sheep Owners Society has set up a colour classification for the three shades of moorit as follows:

☐ chocolate — the darkest and richest of the browns.
☐ cinnamon — the middle shade of milk coffee brown.
☐ fawn — a pale and delicate shade of beige.

The different shades of moorit sheep had already been noticed in 1933 by Dr H. Bonikowsky, who described three colours of brown in Russian sheep — coffee brown, milk coffee brown and chocolate brown. In 1967, Dr J. A. Nel described five browns in the African Karakul sheep — reddish brown, black and brown mosaic, grey and brown fibres intermixed, black and brown mosaic with white fibres intermixed and coffee brown.

The most common breeding plan used in South Australia is to use the moorit ram over black ewes, in which case all the lambs are black but carry the brown gene. **Then** a brown ram is put over the lambs from the first mating (when they have reached an appropriate age) the 50% of the lambs then born are brown (the other 50% being black fleeced, carrying the brown gene). Naturally a brown ram over brown ewes will produce 100% brown lambs if each is a true moorit.

Other mating programmes have been carried out and it was found that mating a moorit ram to white (homozygous) merino ewes and then mating a moorit ram to their offspring was equally successful in producing 50% moorit lambs and 50% white lambs and presumably the results would be the same for any other breed of sheep. Mating two 'carriers' of the brown gene (heterozygous), be they white or black, would give 25% brown lambs.

As far as we know, there is no way to identify a sheep carrying the brown gene. In the past it was thought that sheep with brown guard hairs, or brown faces, such as those seen in the Suffolk x Merino breed, could be brown carriers, but this has since been proved quite false.

In a flock at Gawler, South Australia, 92 black faced-ewes were mated to a moorit ram. Ten of these ewes produced moorit lambs, confirming that at least 20 ewes in that flock were carrying the brown gene but had not been identified until that mating.

Breeders of moorit sheep have noticed a marked degree of colour fading in their animal fleeces. This is known as 'fading with age', the same sort of colour change seen in humans as their hair becomes grey. In one flock, a slower fading was seen with the wethers.

So, a more accurate description of the colour of the moorit fleece could be recorded. The fleeces were valued against a Munsells Soil Colour Chart using the usual 1 cm of each wool staple (the wool closest to the skin). The results showed the fleece samples were Hue 5YR, with a value/chroma range from 3/1 through to 7/1.

Indentification of a true moorit can be tricky. Many genetically black sheep may look brown from various causes, for example dietary deficiencies such as selenium, cobalt and copper or environmental factors causing 'weather tip'. Very pale grey fleeced sheep can also be confused with moorit.

A combination of characteristics needs to be looked at to identify a moorit. First of all if you think you have one, look at its face. The facial hair is brown, the eyelids, lips and eyes are brown. Inside the mouth, the skin is mauve, while in a black sheep it is dark brown and in a white sheep it is pink. Look at the hoofs and horns. A moorit's will be dark brown, a black sheep's will be black, though this can be hard to identify properly as weathering of the horn may mask the true colour. The fleece itself may be deceptive. Lambs are often born with a brown birth coat which is quite misleading.

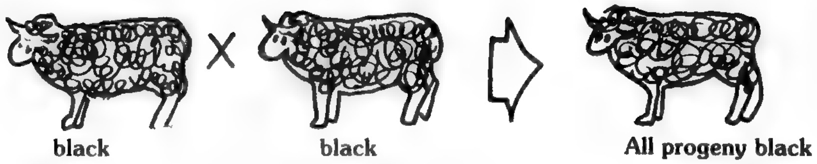
For positive identification, always look at the face, then clarify the genotype with the horn, hoof and fleece colour.

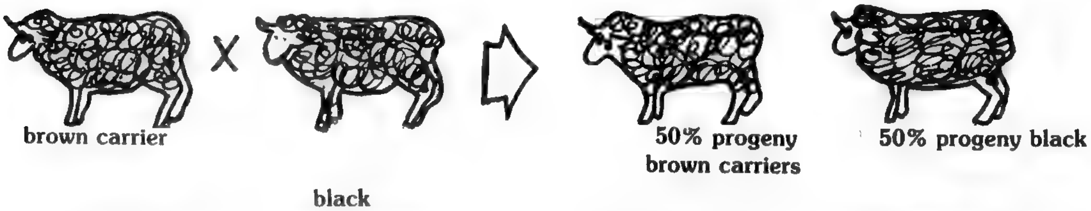
Stefan Adelsteinsson, the Icelandic geneticist, was amused when asked how one goes about breeding **for** moorit, or the even more elusive tan genotype, as he spent a lifetime trying to eliminate tan from Iceland's sheep population. He theorised that it would be equally difficult to breed a fully tan coated sheep at the colour seems to be reluctant to spread from the head and legs of the sheep as seen in the South Suffolk breed and in the harsh outer coat of some of the European breeds — a coat which Australian sheep do not have.

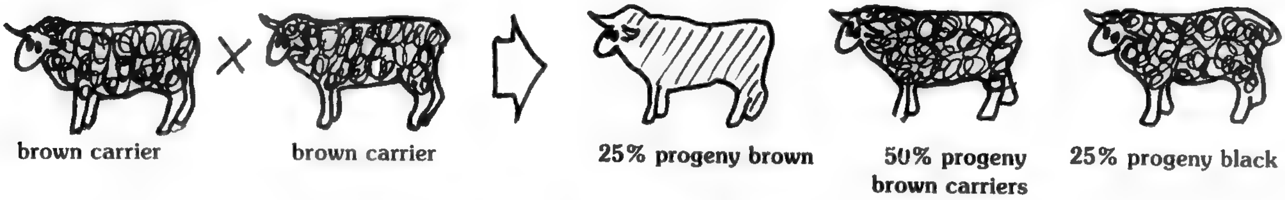
MORE ON COLOURED SHEEP

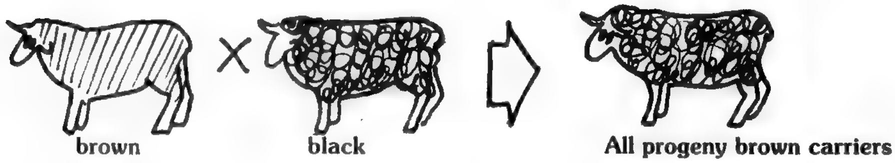
Stories on breeding and raising coloured sheep in earlier issues of Earth Garden include **Mary's Black Sheep** (EG 28, pp10-13) and **Breeding Black Sheep** (EG 17, pp 43-46). **Handbook for Breeding Coloured Wool,** a booklet by Peter Carr and Scott Dolling is available from Department of Agriculture, South Australia, GPO Box 1671, Adelaide, SA, 5001. Send SAE for price posted.

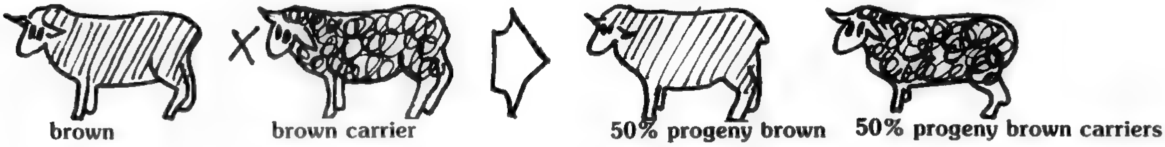
Opposite page diagram shows eight possible matings with regard to black, brown or white fleece colour in a flock of sheep.


black
X
black
All progeny black


brown carrier
X
black
50% progeny brown carriers
50% progeny black


brown carrier
X
brown carrier
25% progeny brown
50% progeny brown carriers
25% progeny black


brown
X
black
All progeny brown carriers


brown
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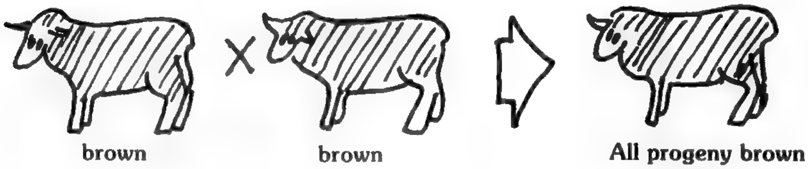
brown carrier
50% progeny brown
50% progeny brown carriers


brown
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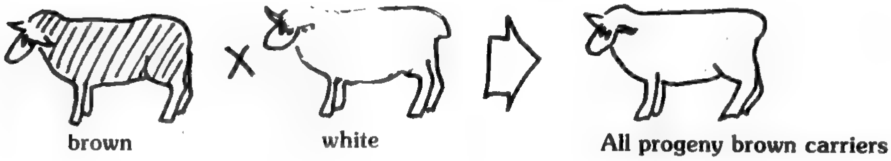
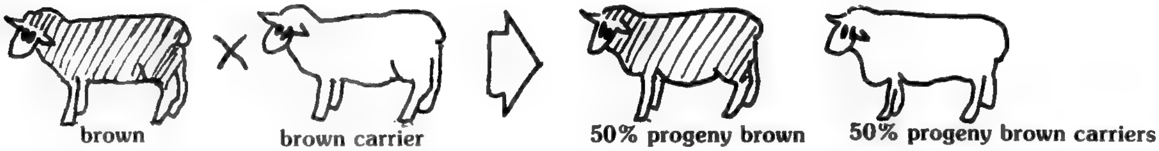
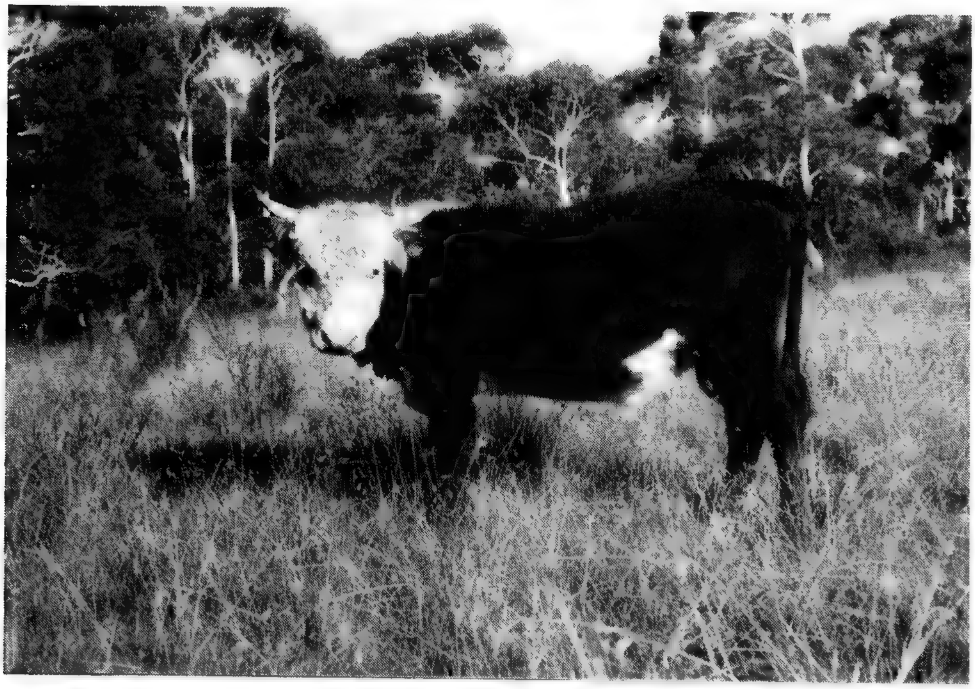

brown
X
white
All progeny brown carriers


brown
X
brown carrier
50% progeny brown
50% progeny brown carriers

Bringing up Bozo



By Greg Baker

Bozo came into our lives one April. There he was 300 metres across the gully, a small patch of brown and white that wasn't there the day before.

Through the binoculars we could see a non-native, non-protected, probably edible animal. My friend offered to get the beers ready while I went and lassooed it, so I grabbed a rope and started running.

Remembering my John Buchan reading, I approached the animal from downwind, the rope coil around my waist ready for action. There he was, a calf, asleep beside a huge broom bush. He woke as I approached and sleepily watched as I crept up, jumped him and forced him into submission like they do in rodeos. It was pretty easy. I don't know why these rodeo types have so much trouble.

To make sure he couldn't get away I wrapped the rope around his neck a few times then tied his legs together till he looked like a large brown and white parcel. The next step was to carry him back across the gully. He was a heavy little bozo for one so small, but I finally stumbled into the house paddock with him. My friend helped me unknot the parcel and tie him to a nearby wattle tree. He fell down exhausted which seemed a bit unreasonable since I'd done all the work.

I decided a few of those beers would help me sort out a nagging thought that had begun to trouble me as I carried him across the gully: where did he come from? My friend didn't have an instant answer, which cheered me up immensely. Perhaps home brew has its intellectual uses after all, as we finally decided it must have something to do with the cow and bull we'd bought nearly a year ago before.

With that feat of reasoning behind us, it occurred to us the Bozo hadn't really reached edible size yet. That meant we'd have to feed him. We piled into the ute and drove to the local stock and station agent to see what they had. For the price of 15 bottles of beer they sold us a bag of powdered milk (with little blue beads as in the television advertisements) and a black rubber teat.

On returning home our suspicions about the cow and bull were confirmed. The cow was charging around bellowing; the bull was doing the same but he didn't look as if he knew why. We decided to hide Bozo so the cow would go and look menacing somewhere else. While my friend barred the house paddock gate with reinforcing mesh and steel posts, I grabbed Bozo, stumbled with him into the back of the shed and tied him up. Breathing a sigh of relief, I strolled out of the shed smiling, to see the cow staring suspiciously through the steel mesh.

The calf started to moo and the cow began leaning on the mesh, glaring at me and pawing the ground. I rushed back into the shed, grabbed two hessian bags and fought them over Bozo's head. Some baling twine around the neck kept it on and muffled his moos. The cow spent three days on the rampage, but we decided to persist. We wanted Bozo to be a bit more manageable than his parents, who were almost completely wild. We wanted to be able to catch him for a drenching and any veterinary tests or treatments.

The feeding routine started that first day. Aware of my deprived, animal-less childhood, my friend thought I should have sole responsibility for this. Twice a day I mixed up his milk substitute, rain, hail or shine, but mainly rain. As he grew bigger he had to be fed more, until he needed up to six full beer bottles each time (we measure everything in beer bottles, our water tank for example holds 126,000 bottles). Still it had its moments . . . like the time he was so keen to get at it he kept sucking the teat off the bottle and I had to brave saliva and teeth to save it from a thorough chewing. Come to think of it, those bottles must have ended up with the home brewing gear, what a horrible thought!

Feeding is a problem. Mind you it seems fair that if they're ever going to feed you, they must in turn be fed. But it is tiring, tedious work and time-consuming.

The next problem began when the instructions on the packet of milk said it was time to introduce green feed. Having learnt the lesson on getting green feed to animals, albiet chooks (see **Self Serve Greens** in Earth Garden 44), I wasn't going to cart it to him. The trouble was that the paddocks where the sheep were dying were a bit thin on it, being mainly tussock surrounded by rock and powdered clay. They'd eaten out all the blackberry and broom.

It looked like we'd have to tether him on the unimproved areas outside the sheep house paddocks. Our previous experiences with tethering (sheep) told us that Bozo needed a chain. The chain locker yielded a suitable length and the steel heap a spike to secure it in the ground. So we tethered him and let him pick the herbage over between the beer bottles of milk. Whenever he'd eaten it down to ground level I'd move him and take him for a run. Could this little Bozo go! He'd charge around the place dragging me through the shrubbery at the end of the chain. You'd almost think he was trying to escape, and after all I'd done for him!

That led me to the next problem: the chain. Lets face it, tethering must really be a last resort. Calves (or indeed any animal) need exercise and they should be allowed to choose their own green diet from as wide as area as possible. A chain also wears and irritates the skin around their necks and tethering with infrequent moves, slows the animal's growth.

On the theory that he'd been ours for six months and would therefore be ours for life, we let him off the chain and into the huge 40 hectare world. Without parental guidance he has had to form his own tastes. For example now that he isn't forced to eat prickles he has developed a taste for concrete. We dumped the concrete rubble from around the house slab in a heap outside the house paddock. Bozo hangs around the heap, chewing slabs of concrete, frothing it up in his mouth with great trails of saliva hanging down to the ground.

He clearly has a deficiency, but we can't work out whether it is physical or mental. I favour that latter theory on the basis that male cattle are like that. The bull for instance was prone to wild charges down the gully ending up at his favourite stump. He would practise matador-throwing techniques on the stump, churning the ground around it into a huge dust bowl or quagmire, depending on the weather.

The other thing Bozo has taken to is metal. He spends hours sucking the zinc off galvanised fence wire, leaving a white froth like toothpaste or shaving foam all over it. Gate catches are a favourite. His one great success was to open the gate into the house paddock and find the delights therein which included the oats ready for reviving the sheep and the vegetable garden. My gardening friend was less than impressed by his presence and even less with having to help get him out. He wouldn't be tempted to leave by good, nutritious food like salt, so I had to grab him by the horns and drag him out. Four calf feet are well and truly a match for the two booted human, so I had to restrain him with a finger in each nostril while my bare-footed friend came to lend a hand.

My friend pushed while I pulled. It was slow, hard going, but it worked. And Bozo was really nice about it all. Just as we approached the gate he decided to save us the trouble of carting manure. My friends feet ended up wearing a pair of brown sandals, the kind with little projections up between the toes. We finally got him out and closed the gate on him, manipulating the catch with a couple of sticks. Bozo stood around for hours outside watching us wherever we went and looking hurt. My friend spent a long time taking off those sandals.

It really worries me that he'll get in while we are away sometime and discover the house slab, because a mouth like his could get through a lot of concrete in a couple of days. The solution, we hope, is to have a rock leaning on the gate to keep it closed. The rock has turned out to be a bit of a problem for visitors who have to stand outside shouting in the hope we'll hear them and open up.

Bozo has become a nuisance in other ways, too. He insists on coming along whenever we go for a walk. His walking technique is to continually let us get a 50 metre lead and then catch up with us. There is nothing quite so unnerving as a horned calf charging up at full speed behind you.

Tame calves are a problem, too. If they're not a bit scared of you they are very difficult to handle. This may sound contradictory, but for beef cattle that is our conclusion. If they're a bit wild, but not too wild, you can get them to go where you want a bit easier. There is a fine line between cattle being so wild that they stampede when you get in sight and so tame that they always come up to you when you appear. Fully-grown bulls are terrifying at either extreme!

Also if they're raised by humans, they're probably not as self-reliant. Take for example the time Bozo vanished. We didn't see him for four days, not a sign. I was delighted, but my friend thought that four month's meat was worth searching for, so we put the 9% home brew back in the refrigerator and began to comb the tussock, blackberries and old mullock heaps.

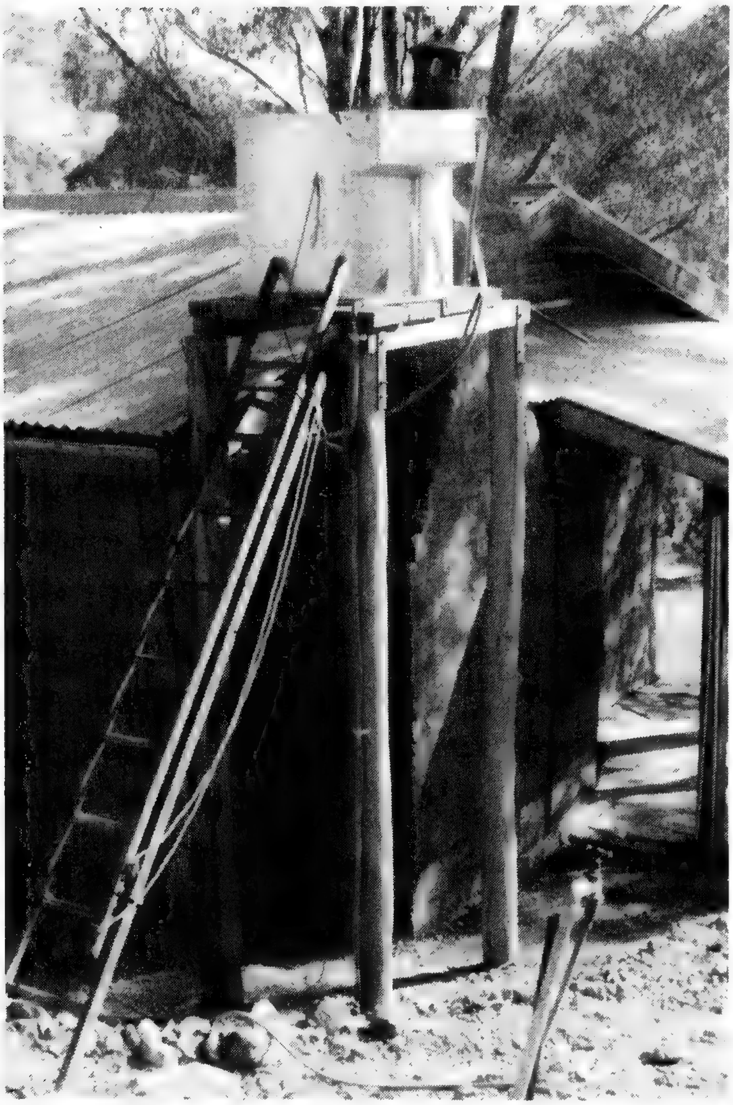
My friend found him. The instinct for meat is very strongly developed in some people. There he was, the cliff down which he appeared to have fallen at one side and surrounded on all other sides by blackberry bushes. He had carved out a two metre hole for himself and churned it into a swamp (we had a bit of rain). After my friend hacked a path to let him out, he walked straight past without so much as a nod of the horns and got stuck into the grass, treating the rescue as his due.

After the bull had his unfortunate accident while trying to occupy the same space at the same time as 9 grams of lead, Bozo teamed up with his mother again. He has become just a bit more wild, but not wild enough, the damage having been done. What did we get for the all-up price of seven cases of beer and six months of bother? Four months supply of self-preserving, mentally deficient and stunted meat. To my mind the catalogue of problems is a long one. Are there any real advantages in hand-raising beef? With hindsight I'm hard pressed to think of any that outweigh the disadvantages, apart from the experience that is.

The next time a calf lobbed in, the bull having done his job before the accident, we thought about a repeat — for about two nanoseconds. About an hour after we first saw the new calf, curiously under the same broom bush, the cow and Bozo teamed up with it. Now we don't have to worry about a thing as we've worked out where to get them where we want, using a strategically placed salt lick. It would be no use if we wanted them in a hurry, but it works and if we were in that much hurry we'd probably still be nursing ulcers and high blood pressure in the city.

As for Bozo, he'll be a four-monther, just as his father was a 10-monther, the whole boned 10 cubic feet of him.

HOUSEHOLD PLUMBING



Water storage tank is mounted on a high bush pole stand to make use of the thermosyphon principle, so no pump is required.

By Chris Martin

At 'Mullionkale' we have just been through the problems of installing the internal household plumbing. The system is based on a **Beasley 5 MSC** storage tank and a **Graham** slow combustion stove with solar water heater connections which we will put in before next summer.

Tanks. Despite a thorough search we were not able to buy the type of tank we required and the Beasley was the compromise. The modern tanks designed to utilise solar hot water were also made to fit into ceilings, which destroys the idea of mounting the old style narrow but high tanks on top of a wood box.

We soon discovered that the tank has to be relatively high because solar hot water, like a combustion stove system, works on the thermosyphon principle in which the collecting unit has to be above the hot water generating source. It is possible to have the tank below the source but this means installing a pump to circulate the water. As well as this, the tank has to be above the highest delivery point as ours came with a header tank attach to the side of the main tank. The old system of putting a pipe up through the roof equal to the height of the main supply is avoided by this approach.

We also had no option but to purchase the unit with an electrical connection including a heating element, which is useless to us as we don't have mains electricity!

Due to all these problems we consequently had to install the tank on a stand outside the house and as we have very cold winters we will have to provide cover and additional insulation for the tank.

Pipes. At our previous house all the piping from the storage tank to the various outlets on the house was galvanised iron and every time the system boiled we got very dirty water. We also have to be very careful that a cold water tap was not turned on elsewhere in the house while someone was having a shower as the water could become boiling hot due to the cold water flowing to the lowest point first. Therefore we decided to purchase the largest size copper pipe we couldn't afford.

Copper pipes come in two types: rigid and annealed.

The annealed pipe is sold in coils and both types are pre-lagged in most sizes, which is important to us as most of our pipes had to run outside the house and we didn't like the idea of wrapping the lot in hair felt to ensure that the water stayed hot.

Rigid pipe is cheaper but annealed pipe has the advantage that it an be twisted or curved gently without heating. Sharp curves are not possible without the use of a special set of springs, but one friend who has tried the springs said they were very difficult to remove and found it easier to use the manufactured fittings. The only disadvantage with annealed pipe is that it becomes slightly oval-shaped when rolled and sometimes there are gaps between the fittings and the pipes.

Thermosyphon is a natural phenomenon that operates on the basis of hot water rising and cold water falling. There are several traps for the unwary in using this system.

Piping. A minimum of 25mm ID pipe should be used. Copper is preferred due to its non-corrosive characteristics. However, its one fault is that it is an excellent conductor of heat, out as well as in. The hot pipe should be on top.

Lagging. All pipes from the stove to the tank should be lagged with either hair felt of foam. This saves heat loss which in turn enhances the thermosyphon action.

Distance. The distance between the fire box or water jacket of the stove and the storage tank also has an effect on the efficiency of the thermosyphon. We have friends who have the same stove as ours and their tank is only 1.5 metres away. Their water boils in about three hours. Our tank is 4 metres from the stove and so far we can get our water just hot enough for household needs.

Bends. The number of bends has a direct influence on the effectiveness of heating the water as each additional bend, especially on the hot pipe, creates friction thus reducing flow. A maximum of 90° bends is acceptable. The use of annealled pipe with gentle curves reduces this problem but it is difficult to obtain in large sizes.

Levels. The hot pipe from the stove must always be at least level, or preferably on an upward gradient. Any downwards gradient on this pipe will create an airlock, or in severe cases will interrupt the circulation entirely. Most of these issues have been a part of our problem due to tank location. The only way around them for us appears to be a small circulation pump.

Taps. We found that a stop cock installed on both the cold inlet and the hot water outlet of the storage tank enabled us to drain the tank to clean it out without turning off the cold water to the hose while we could also make any repairs or additions to the piping on the hot outlet without losing the hot water in the tank.

Unless the hot water jacket in your stove outlet has a dump valve at the bottom you will also need to put either a tap or a union in the cold water line near the stove. This is required so that you can drain the stove tank to clean out sediment and also drain the hot and cold water lines between the stove tank and the storage tank. It is also handy in case you get any leaks in joins between the two tanks.

Fittings. Yorkshire seems to be the most popular brand available and has the widest range of sizes and fittings. Three different kinds are commonly available: **plain, pre-soldered and Yorktite.**

The **plain** are the cheapest, but this means that the pipe has to be pre-tinned before inserting in the fitting.

Pre-soldered are the most popular and have a small ring of solder inside the fitting. However, a bead of solder should also be run around the end of the fitting, especially when using annealed pipe, to ensure a water-tight join.

Yorktite is a relatively new type of fitting that does not require soldering and works by compression in a similar manner to polypipe fittings. The range is restricted and they are quite expensive, about three times the price of the pre-solered fittings. However, they are useful for emergency repairs on fittings in a difficult position which continue to leak despite several attempts at re-soldering.

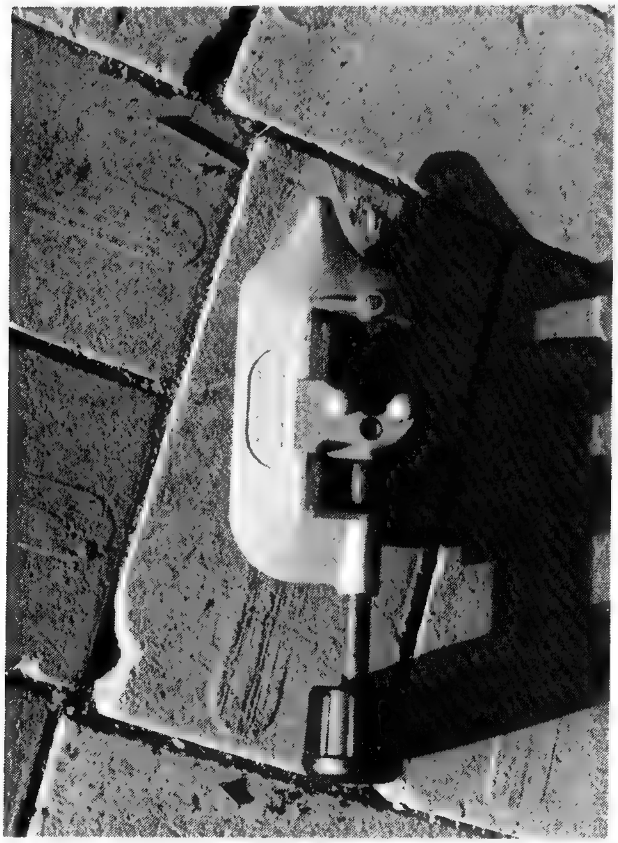
Tools. Very few tools are required to do your own copper plumbing. The only items needed, apart from the regular carpentry tools, are an LP gas torch and preferably a small pipe cutter. Our cutter, which cost $16.00, will cut pipe up to 37mm and provides a bevel at the end of the pipe, thus eliminating burring caused by hacksawing which has to be removed.

The cutter also has a dome-shaped blade on the end which is used to 're-round' out-of-shape pipe. The cutting wheel is fairly fragile so pressure on the clamp should only be applied gradually. Or course you also need capillary flux and additional solder.

Technique. Cleanliness is very important in copper plumbing. Bright fittings and pipe need no preparation, but dull oxidised copper must be burnished to remove all possible contaminants. Steel wool is the easiest and cheapest way to achieve a satisfactory result. Once the pipe ends and fittings are in good condition they should be coated with a thin layer of flux.

All pipe ends should be placed into the fittings before heating. You cannot solder one end at a time as there is enough heat generated to melt the solder at all points of the fitting and you end up with solder running everywhere and having to re-tin one end.

Start heating the bottom end of the fitting first as the heat will rise and will melt the solder in nearly all joins at the same time. The flame should be moved gently around the



Small pipe cutter.

Soldering pipe fitting.

fitting with the innner blue point, the hottest area, close to or touching the copper.

You will notice that the flux will start to bubble and shortly afterwards the solder will melt and a small bead is usually seen at the end of the fitting. Stop heating and apply extra solder at the end of the pipe adjacent to the joint so that a complete seal is obtained. Wipe excess solder away before it sets. Repeat this process at all higher points as necessary.

If you are working underneath the fittings, **it is imperative that you wear safety glasses,** as solder usually drips down when sealing a joint. Joints, particularly those hanging vertically, should be supported until the solder has set.

Problems. Very few problems will ensure if you follow the method described, though there will probably be at least one leak when doing the work. Simply turn off the water, drain the system at the lowest point and resolder the offending joint.

When plumbing through walls it is necessary to leave at least 3cm at each end of the pipe in case any leaks occur in this area.

There are often problems in fitting the last piece of 1 inch pipe into the tank. We found that by working from the stove back to our tank there were no problems as there was sufficient movement between the inner tank and the outer wall to allow the last joint to slip in.

The only real problem was with the standard set of fittings to cover the bath and shower. These only come in 12mm and reduce the water flow greatly, so they will not work effectively from a low pressure system. We overcame the problem by using open-ended cocks and prebrazed T-fittings. The cost was about double compared to the ready made 12mm set, but the peace of mind in knowing that we weren't going to get burned was worth it.

Conclusion. We approached this basic household need with a great deal of trepidation. However, practice and common sense have proved that there is really no major problem and we have saved ourselves a great deal of money by not employing a plumber . Unless there are local regulations prohibiting home plumbing, we see no reason why anyone whose home is not connected to a town water supply should not be able to do their own work.

Bringing Batteries Back from the Dead

(Without going there yourself)

By Norm Melford

What can we do with those old lead acid car or home energy plant batteries when they look as though they've had it?

When you have a substantial investment in them, it's probably worth considering various alternatives to trading them in for scrap.

Short circuits. There are two common types of battery failure. One is an internal short circuit between the plates, which usually shows up as one or more dead cells. This may be caused by foreign matter or by bits of paste coming loose from the honeycomb of the plates.

The approach here is to try to knock away the offending matter, or failing that to wash it clear. Try giving the battery a thorough shaking. If that fails, try hosing it out (after first carefully removing the acid). If you can't wash it clear, depending on the type of case, you may be able to open the top pitch seal (if it has one), use a hacksaw to cut the straps linking the cells and carefully remove the plates from the dead cell for washing. You could re-seal the top with a solding iron and rejoin the links with solder. (1)

Sulphation. The other common cause of failure is sulphation. Here, through old age, insufficient fluid, or excessive standing while discharged, the active chemicals have changed to a more stable form that resists the normal charging action.

A possible cure lies in the following steps. (2)

1. Carefully remove the acid and wash out the cells with clean water.
2. Fill with a solution of sodium sulphate (Glauber salts) in water, 1 part salt to 5 parts water by weight.
3. Charge battery for twice the normal full charge time, for example 80 amp hours (Ah) for a 40 Ah battery). This is double the normal time, not the normal current.
4. Empty, wash out and refill with 1.2 specific gravity (SG) acid.
5. Discharge at a current of about $\frac{Ah}{100}$ when Ah is the normal amp hour rating of the battery for 24 hours.
6. Recharge normally and if necessary correct the SG to the manufacturers' recommendation by removing or adding acid as required.

Prevention is better than cure and it has been suggested that adding a small amount of sodium sulphate to the battery in service might be effective.

I have not personally tried these solutions which have been promulgated in Amateur Radio circles. However, since they are cheap, there is much to gain and little to lose from having a go.

Battery Safety

Warnings. Remember that in normal use, as well as during rehabilitation, batteries and their components must be handled with respect. Wear gloves, glasses or goggles and protective clothing (sleeves rolled down, collar buttoned up).

Keep fresh water and perhaps a solution of baking soda on hand to deal with any splashes of acid. Keep the area where batteries are kept or where you are working with batteries well ventilated. A battery being charged gives off a very explosive mixture of hydrogen and oxygen and a spark from a loose connection can cause an explosion. Always switch off the charging current remotely. **Never** just unclip the battery being charged — a spark is almost unavoidable if you do.

So called 'no maintenance' or 'minimum maintenance' batteries (3,4) have been said to explode through internal problems. So be careful. In fact, any battery with internal links between the cells may be at some little risk. (4)

References

1. RSGB **Radio Communication,** May 1981 (page 436).
2. RSGB **Radio Communication,** August 1981 (page 725).
3. **Electronics Australia,** June 1981 (page 79).
4. **Electronics Australia,** August 1981 (page 80).

Drains for rains

I'm fixing a hole where the rain gets in
and stops my mind from wondering
where it will go ...
THE BEATLES, Sgt. Pepper's Lonely Hearts
Club Band, 1967.

By David MacMunn

The sight of continual rain falling outside tends to make you think about where all that water is going, unless you can actually see where. Your mind ponders on that piece of guttering you didn't fix or the blocked drainpipe down there under the road.

It's amazing how much soil can be moved in a rainstorm. In a particularly heavy recent storm I watched a section of bank and could see the alarmingly quick movement of soil flowing down it. Almost spooky.

What the rains usually mean here in northern New South Wales is the need for road maintenance. It seems that people have an almost competitive streak when they devise access routes to their land. Because of the desire to 'get away' many roads are long, steep or in poor condition.

Most roads are partly cut into hills to reach a particular house site, so water movement off the hill and its removal is a problem. Certainly, it is important to have ground cover on all banks. We generally use lemon grass because it is hardy, free, spreads quickly and holds the soil well.

Usually, there is a need for a gutter of some sort down the road on the hill side to stop the road becoming a pig-pen. These may work quite well but they require regular maintenance as they tend to grow over the silt up. This is a problem also for spoon drains cut across the road to allow the water to run off (it has to cross the road somewhere). These can suffer from breakup caused by car tyres. I generally take a walk down the road when the rain starts and clear out the drains and gutters, which can save major work later.

Open drains are probably the most basic form of drainage. They have the advantage of helping the water running off the hill to move away and also to run down the road. It would be nice to be able to use concrete pipes everywhere, but they are expensive. In my area an 8 ft Humes pipe 9 inches in diameter costs about $35 (or $40 if you want 12 inch diameter).

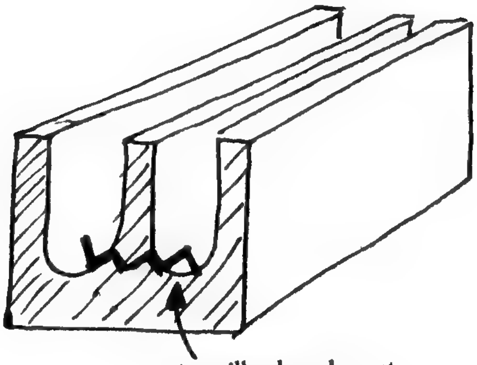
So the ever-fertile minds of the un-moneyed masses turn to 'alternative' solutions. Here are some:

1. A hollow log can be successfully used as a drainpipe. Set down and patched around with dirt it will perform well. These logs are sometimes quite large in overall diameter so they may require an extra degree of excavation.

2. A 100 mm (4 inch) plastic agricultural pipe can be used for smaller drains where you need to collect and move away surface water. If the pipe is bedded in with gravel covering it and extendng to the surface water will flow down through the gravel and out through the pipe.

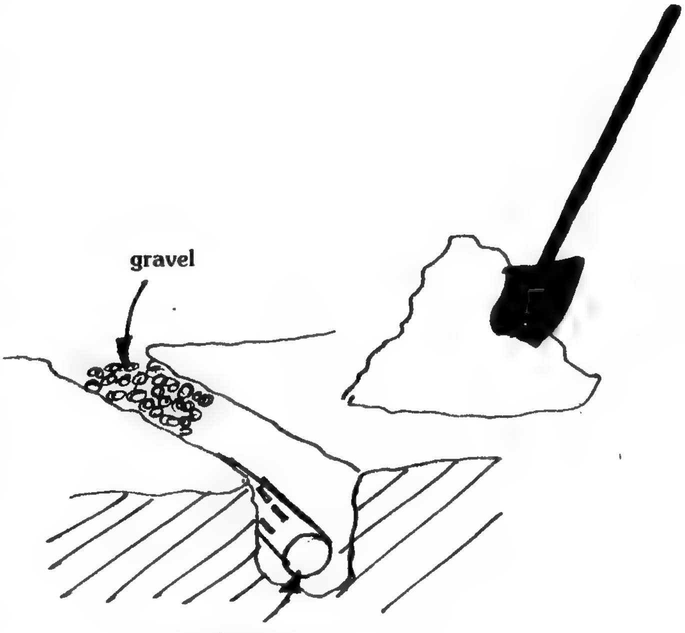
3. Another good method, which is cheap, is to use concrete Besser Blocks. While you can use standard 8 in x 8 in blocks butted, I used 'lintel blocks' which come with a knockout centre ridge projection which leaves a hole when it is removed.

BESSER LINTEL BLOCK



I first excavated the hole for the pipe and laid a sheet of galvanised iron, folded three times, in the bottom. All joins between the butted blocks were covered with a sleeve of light metal (actually sections from an old swimming pool liner). The earth was shovelled on top of the pipe and packed down. The drain is quite effective and, at 60 cents per block, cost about $5.00.

It is important to pack dirt around all piping to prevent movement. Pack and tamp earth on top of each pipe for at least 6 inches to reduce pressure on the pipe.



HANGING A DOOR

By Dr Robert Rich

I know a man who is a specialist. He does nothing all day but hang doors in new buildings. I'd hate that. I enjoy hanging doors and find them a bit of a challenge. It pleases me for weeks afterwards when I walk through a door I hanged: it swings just so, doesn't bind or rub anywhere and stays nicely on its hinges. This is an achievement for me — it wasn't always so!

Two inexperienced people working as a team might take half a day to hang a door which then binds and scrapes all over the place. An expert will do a perfect job all by himself, in most cases taking about 20 minutes for the job.

I am not quite an expert: If there are no complications I need about an hour to do a good job. But, after a lot of practice, and some instruction from tradesmen friends, I know the 'tricks of the trade'.

Preliminary

First make sure that the door opening is the correct size (check the regulations). An illegal doorway is also inconveniently small. Many owner-builders fall into the trap of buying secondhand doors, then building door frames to suit them, which often results in an undersize opening. It is better to make the opening too large and, if necessary, to enlarge the door by screwing thin strips of wood on the edges.

The door frame should be square: no, not as wide as it is high, but with 90° corners.

The door jambs should be plumb in both dimensions, that is:

(a) not leaning into or out of the room;
(b) providing a vertical surface for the door edge. See **Fig 1.**

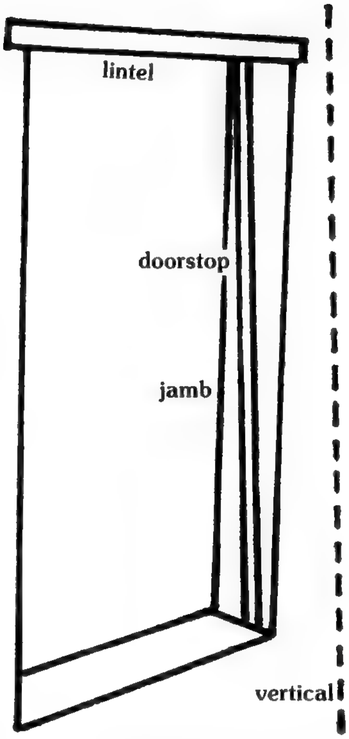
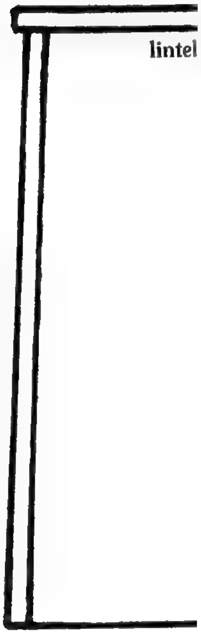


Fig. 1. Potential problems with the door frame.
a) Frame leans out of plumb.
Solution: Fit doorstop to true vertical (or pull it down and rebuild).



b) Frame out of
Solutions:
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deeper.
ii If jambs tl
plane to tru
iii If size of o
fit wedge-sh
wood to
faces of jam
iv Dismantle,
rebuild.

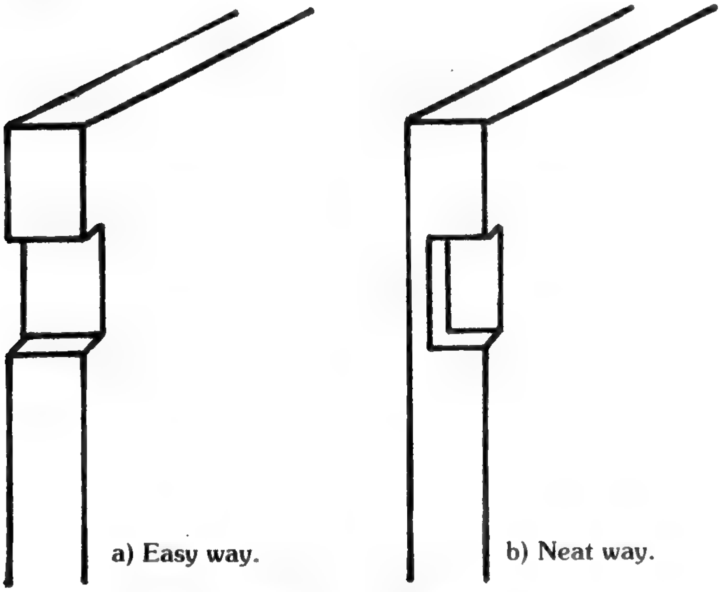

Fig. 2. Housing cut for hinge.

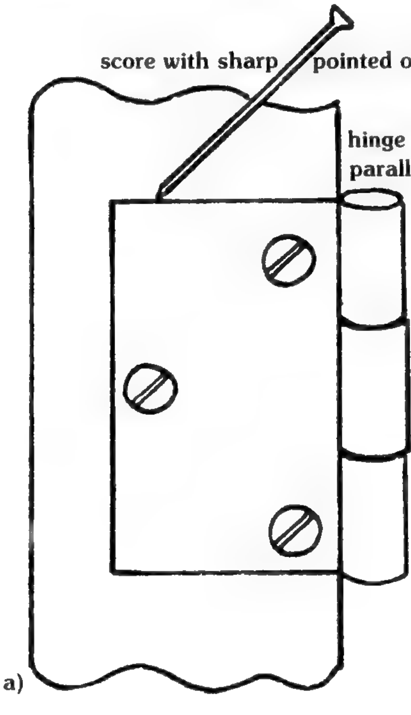
score with sharp pointed object
hinge barrel exactly parallel to door edge
a)

Fig. 3. Fitting
a) Marking. Hin
on the side wh
will open.
b) Marking thick
of housing is
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c) Cutting housi
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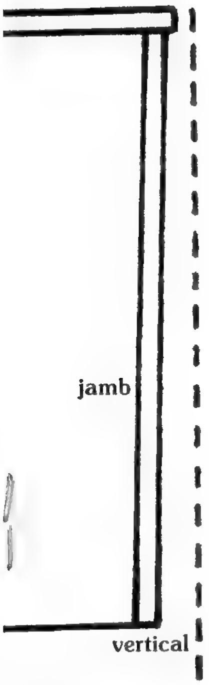

square.

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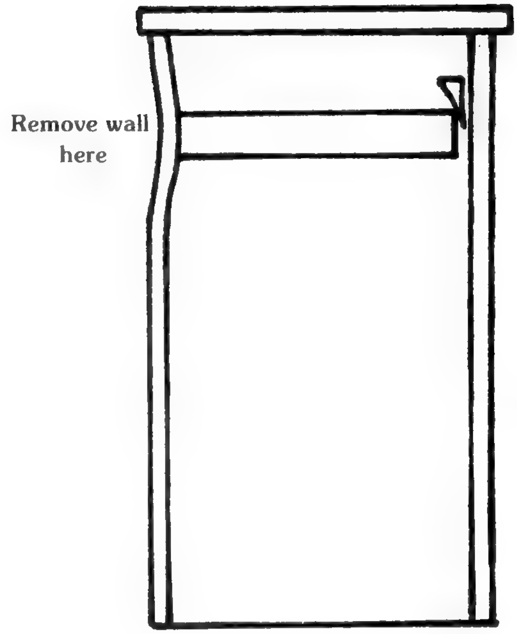
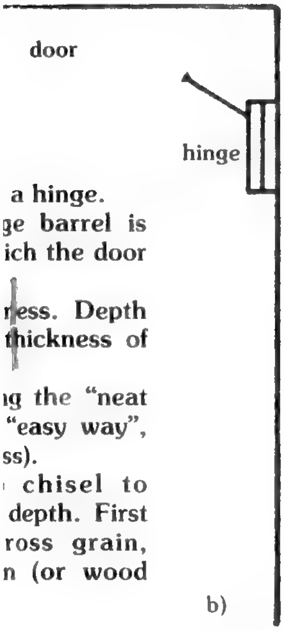


c) Bowed jamb (can happen in earth or masonry walls).
Solutions:
i Plane straight if jamb thickness permits.
ii Bash hole in wall behind bowed jamb. Use beam and wedge to straighten jamb, rebuild wall.



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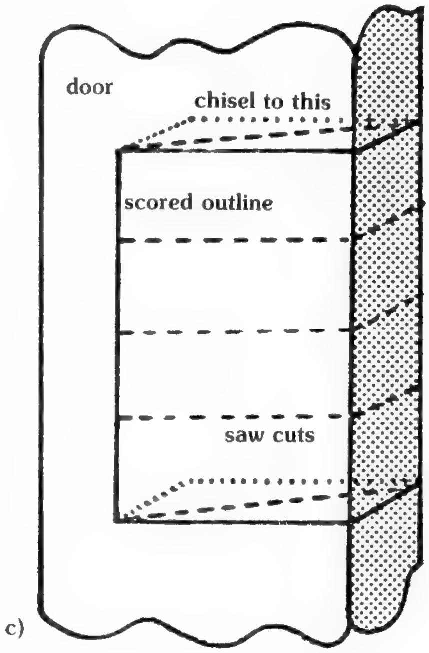


It is possible to correct a faulty door frame (for example by nailing on a thin, wedge-shaped strip of wood, or if necessary by dismantling and rebuilding the wall!), but it is far less work to do it right the first time. A distorted, out-of-plumb door frame looks terrible, makes it impossible to fit a door well and will always be draughty.

A bowed door jamb is another trap. Mudbricks, rammed earth or masonry can exert sideways pressure while being built against a door jamb. With rammed earth it is necessary to put a temporary horizontal prop into the door opening to prevent this (even if the door jambs are railway sleepers). With stonework, bricks or mudbricks, it is merely necessary to ensure that the frame is not thumped as the mortar is worked into place.

If there is a substantial bow, there is nothing for it but to knock out the bit of wall that is bending the jamb. A hefty piece of wood and a wedge will then force the jamb straight again. It should be left in place for several days, during which you will probably take a rest in disgust. If the bow is only minor it can be planed out, but make sure you don't have to thin the jamb so much that it is weakened.

Let's assume the door frame is alright. Next, inspect the door, especially if it is secondhand. You may need to re-glue loose mortise-and-tenon joints, replace cracked panels or broken glass, plane the bottom parallel to the floor, or make the door larger by attaching strips of wood to an edge or two.

If it is at all possible, fit doors after a period of extended wet weather. They should then have a clearance of 2.5 mm at the top and sides. You should have a gap of 12-25 mm at the bottom. The drier the wood, the more clearance is needed to allow for swelling. In summer, size the door so that it just overlaps the doorstops.

New doors also have a problem. They are usually made to be slightly larger than the specified size, so that they can be cut down for an exact fit. The 'stiles' (main vertical members) usually project past the top and bottom like horns. These need to be cut off, even if the door otherwise fits.

If the door is too large for the doorway, you should mark and cut or plane it to size. Set up the door so that it butts against the door frame. It can stand on a couple of thin wedges, such as chisels. Hold it temporarily in place with two nails in inconspicuous places, such as the underside of a rail. Draw lines 2.5 mm in from each jamb. This can be done by sharpening a carpenter's pencil on one side only and holding it flat against the jamb. These lines have to be drawn from **inside** the doorway.

The first time I tried to cut a door down to size I was following instructions from a book which didn't tell me this. I spent hours trying to work out how to use the jamb as a pencil guide (as the book instructed) when the door was in the way!

Take down the door. Draw a line parallel to the top marks, but as high as possible. Now saw or plane to this line and to the two lines on the sides. You can hold the door immobile during this by nailing blocks to the floor (or to sawhorses) and wedging the door between them so that the top and bottom edges are vertical.

Now the door should fit into the doorway and butt up against the doorstops. Set it up on wedges so that it has the right clearance at the top. Set a pair of compasses to the desired gap at the bottom and use them to draw a line on the door which is parallel to the floor. This is called **scribing.** Again, hold the door with blocks so that you can saw the bottom to the scribed line.

Fitting hinges

It is easiest to recess the full thickness of the hinge into the edge of the door, though this is not traditional. Usually one leaf of the hinge is recessed into the door and the other into the frame. A tradesman pointed out that this is twice the work for the same effort.

Fig 2 shows two ways of recessing. The first is quick and easy. It ignores the width of the hinge: the recess is the full thickness of the door. The second method is the 'proper' one: to house the hinge exactly, so that it is hidden from the other side of the door.

Fig 3 shows the steps needed to fit a hinge. Don't forget to put the hinges on the correct side of the door and facing the right way! If in doubt, stand the door in place and mark in the way the hinges are to go. First mark in the width and thickness of the hinge. The **housing** (the recess you cut out) should be exact, not too large. So, hold the hinge in exactly the right position, parallel to the edge of the door, and mark with a sharp object instead of a pencil. For the same reason, sawcuts should be made with a very fine point saw. A hacksaw is excellent for this job.

When chiselling out the wood you must avoid splitting the door edge. Go gradually, always severing fibres by cutting across the grain before cutting along the grain. Take care not to go too deep. When finished, the closed hinge should be just flush with the surface of the edge of the door. If it is too deep, the door will **bind** against the jamb, actually press against it in the closed position. The solution is to take off the hinge and insert thin cardboard behind it. If the screws you use have heads that are too large, or if the hinge sticks up beyond the surface of the door edge, you have a similar problem, binding at the hinges themselves. Binding will pull out the screws and in time may damage the door.

At last you can drill holes and screw on the hinges. You can use 8 gauge screws for doors, but make sure the heads fit snugly. They should be at least 25 mm long for hardwood doors and at least 37 mm (1½ inches) for softwood. In softwood the hole drilled should be as small as possible in diameter. One trick is not to drill, but to hammer in a 2 inch nail and pull it out. In hardwood an 8 gauge screw needs a hole made with a ⅛ inch drill bit. This is just 'too-small-enough' to allow the screw thread to bite into the wood.

Time for a hanging

The requirements are:

☐ When shut, the door should butt against the doorstops without any gaps showing, yet not rub against the lintel, the door jambs or the floor.

☐ It should be able to go through its full swing without touching the floor at any point. If the floor slopes upwards from the door, you might consider swinging the door the other way, or giving it a sloping bottom edge.

☐ There should be no tendency for the door to swing open or shut under its own weight. This means that the hinges must be in exact vertical alignment.

All this can be achieved by setting up the door on wedges in the open position. A tradesman will use one wedge, near the outside edge of the door. He then lifts the inside edge so that the top hinge is in the right position, puts in a screw, removes the wedge, puts a screw into the bottom hinge and tests for fit.

For the amateur builder it is easier to set up the door on two wedges so that the door is vertical in both dimensions (face and edge), at the right height. The edge of the door should not be hard up against the jamb, but set up so that when the door is shut it will just butt up against the doorstop. That is, the barrel of the hinges should be the thickness of the door away from the doorstop (if anything, there should be a bit of clearance).

When the door is lined up to your satisfaction (or better), fit one screw to each hinge. Remove the wedges and shut the door. The fit might not be perfect, for example the hinges might be too close to the doorstop so that the door hits it before being properly shut. Don't despair. Put the wedges back, remove the screws, fit again with a new pair of screw locations and test it again.

Any incorrect hole can be plugged. A good wrinkle is to dip two dead matches (no good wasting live ones) into glue and hammer them into the hole. Give the hole a good start with a nail, so that the drill bit doesn't skate back into the old one.

COUNTING WATTS

ANOTHER WAY TO COUNT WATTS

By Greg Baker

In **Earth Garden 44,** I set out a method for determining the power consumption of electrical appliances.

Here is another method which is useful for low wattage appliances which also relies on the grid system and the electricity meter. Inside the meter you'll see an aluminium disc which (usually) has 100 evenly spaced marks around its circumference. This disc rotates when power is used. Printed on the face of the meter you'll find how many times the disc rotates per kWh of power used.

To use this information, disconnect all other appliances, attach the test appliance and switch it on. Using the markings on the disc to follow its progress, find out how many revolutions the disc makes in a fixed period of time, say one minute. Or, find out how long it takes for a fixed number of revolutions.

This is all the information you need to work out from first principles the wattage of the appliance.

If you prefer a ready made formula, use:

$W = (1000 \times 3600 \times N)/(k \times t)$

where W is power in watts,
N is the number of revolutions counted,
k is the number of revolutions per kWh and
t is the time period measured in seconds.

If your meter tells you how many kilowatt hours per revolution, then use the reciprocal figure of that figure for k.

As an example, consider a freezer which turns the disc 2.40 revolutions in 60 seconds and there are 400 revolutions of the disc per kilowatt hour. Here

$W = (1000 \times 3600 \times 2.40)/(400 \times 60)$
$= 360$ W

If you cannot turn everything off, such as an electric clock or you have the yoghurt maker on, then find out the number of revolutions of the disc with only these devices connected and subtract it from the reading when the test appliance is connected.

For example, if the 'background' without the freezer is 0.8 revolutions in 60 seconds, the freezer wattage is:

$W = (1000 \times 3600 \times (2.4-0.8)/400 \times 60)$
$= 240$ W.

The formula is:

$W = (1000 \times 3600 \times (N-B)/k \times t)$

where B is the 'background' number of revolutions in the same time period as for N.

Living in the earth

Australian Earth Covered Buildings
Dr Sydney Baggs, Joan Baggs & David Baggs
New South Wales University Press, Kensington, 1985, hardcover, 146 pages, illustrated. Price $19.95.

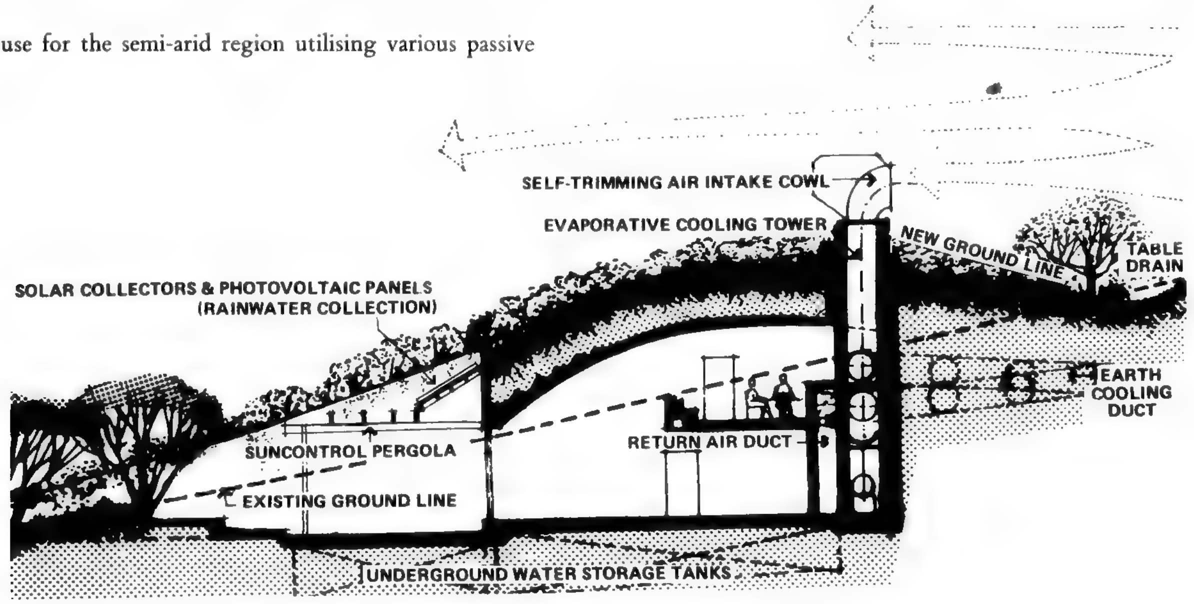
Build your shelter in the earth. You will save space, it will be comfortable and will provide protection against bushfires and cyclones. Your home will be energy efficient, needing less heating and cooling. You can choose to return the surface overhead to its former natural environment or have a 'soft roof' covered with trees, gardens, herbs or sod.

Earth covered buildings are new to Australia, but suited to our wide range of climates. The book explains in detail the philosophy, design and construction principles, planning, finance, site selection, heating, cooling, natural light and landscaping as well as the (very few) disadvantages of earth covered homes.

This work is a family affair: Dr Sydney Baggs is an international pioneer in geotecture, his wife Joan is a researcher and his son David is an architect specialising in passive solar earth covered buildings.

AUSTRALIAN EARTH-COVERED BUILDING

FIGURE 5.3:
Earth-covered house for the semi-arid region utilising various passive cooling systems


SELF-TRIMMING AIR INTAKE COWL
EVAPORATIVE COOLING TOWER
NEW GROUND LINE
TABLE DRAIN
SOLAR COLLECTORS & PHOTOVOLTAIC PANELS (RAINWATER COLLECTION)
EARTH COOLING DUCT
RETURN AIR DUCT
SUNCONTROL PERGOLA
EXISTING GROUND LINE
UNDERGROUND WATER STORAGE TANKS

Geotecture is a conservation-based method of building, one that conserves land surface, thermal energy, and life-cycle and maintenance costs. It frees the soil surface for the growth of vegetation by providing roof-gardens instead of hard roofing such as tiles or metal decking, so it permits recycling of the land surface back to nature. At the same time it encloses the building in a material with a high thermal mass, and hence the capacity to store and save thermal energy. Savings in energy to heat and cool has been variously estimated at 40 to 100 per cent in the short term.

As Australian environments usually preclude timber (because of its vulnerability to termite attack and the initial cost of this material) and sometimes galvanised steel (under certain adverse pH conditions), the following materials are most suitable for Australian environments: reinforced concrete; reinforced concrete block; precast concrete; steel (in specific circumstances); ferrocement; and hybrid construction involving a composite of these.

During the process of building an earth-covered house, stockpiling of topsoil should be undertaken to ensure that it is not destroyed in structure and texture by compaction which would result if building operations were to be carried out on top of it; or by mixing with subsoil. Before the builder arrives on-site, all trees and shrubs that are to be retained should have protection barriers erected around them. A delivery-access track should be marked out to minimise destruction of plants and traffic compaction of the soil around tree roots.

Earth-mounds, berms, slopes, etc, which are part of the earth-covered aesthetic may be an open invitation for children to run, play, roll and climb. The landscaping scheme chosen for your house should either cater for these activities or unobtruseively inhibit them.

Troubleshooting

HOME ENERGY SYSTEMS

By Peter van der Wyk

Areas of neglect and failure in 12 volt systems:

1. Corrosion in contacts. Although copper, aluminium and steel make good conductors of electricity, they cease to conduct when corrosion gets between contacts. It helps to solder all contacts, but aluminium, steel and tarnished copper cannot be soldered. All metal surfaces must be absolutely clean, shiny and untarnished before any soldering is attempted.

If both positive and negative wires are exposed to moisture (for example, in the soil, on the floor, or an ants nest in the junction box), electrolytic action can rapidly corrode the wire and connectors.

2. Corroded battery terminals. Batteries should be regularly cleaned, particularly the top surface and around the battery terminals. Undo the connectors on the battery, clean all signs of corrosion (a file is good for this) from both the terminal and the connector. Smear grease or vaseline over the terminal and reassemble.

3. Shading or partial shading of photovoltaic panels. Even if just a single cell of a solar electric panel or module is shaded, the output from the entire panel will be significantly reduced or even stopped. You can see this for yourself, either by connecting the panel to a volt meter or by placing an ammeter (amp-meter) between the panel and the battery. Now put your hand over a section of the panel and see what happens. It is a good idea to have an ammeter permanently connected between the solar panel and the battery to verify that it is charging.

It is not uncommon for a system to fail because of poor orientation of the panel. The panel may have been well sited when it was erected, but the change in the season may mean that it is permanently shaded by a nearby tree.

A panel not bolted down may blow over in the wind. A vine or creeping plant near the solar panel will stop it charging, even if there is only one leaf obscuring the sunlight.

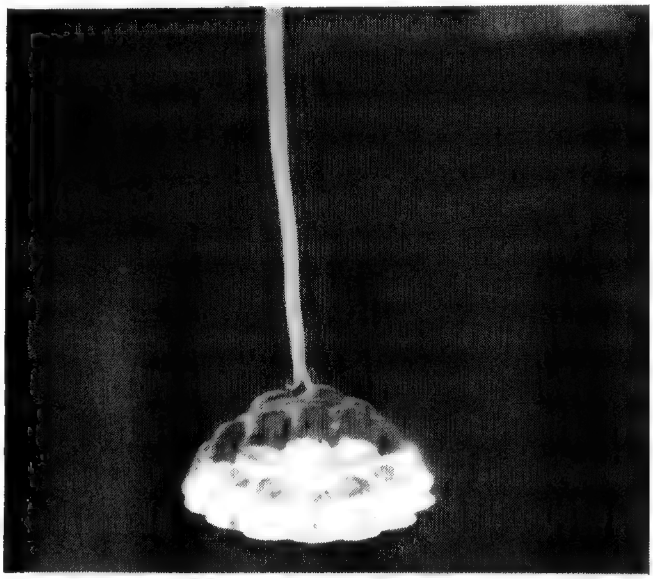
Super Krypton lamps

In editing Peter van der Wyk's article on Krypton filled bicycle light globes in **Earth Garden 45** in the last paragraph on page 55 we wrote: "You shouldn't touch them with your fingers when they are hot — rather hold them in a piece of cloth." Our apologies to Peter, who writes:

I didn't mean it like that. The meaning I was trying to convey is that you shouldn't touch them with your fingers at any time, to prevent grease and dirt from your fingers being left on the globe, thereby causing the globe to retain more of its heat when it is turned on.

At the filament, intense heat is transformed into light (by it glowing white hot), but then that light is converted back into heat when it shines on something. Over a distance this light would not be capable of generating much heat, but the glass of the globe is so close to the sorce of the light, where the light is much more concentrated, that the difference between the light being transmitted through clean transparent glass or being impeded by dirty opaque glass can cause quite a few degrees difference of temperature.

I would extend that advice to all tungsten halogen lights or lights with a high colour temperature. A yellowish vacuum bulb is not generating anywhere near as much heat as a white tungsten light and that heat should be able to be transmitted away from the filament in the form of white light as efficiently as possible. Even dirt on the metal end of the light globe will act like an insulator. Clean metal is a good conductor of heat, whereas dirt and grease act as insulators.



While on the topic, these super Krypron globes are rated at 6V and any voltage in excess of 0.5V (6.5V) reduces their life span significantly. To prevent this you can use one or more 1 amp diodes between the battery bank and the lamps in order to reduce the voltage a bit.

Each diode reduces the voltage by about 0.5V, so if the voltage of a fully charged battery bank is 12.6V (not under charge), two diodes in series would reduce it to below 12V, which would still protect against a voltage of up to 12V. With a photovoltaic charging system without a regulator to protect against overcharging, you may get a voltage as high as 15V. In this case, do not use this type of light in the daytime. The diodes of course will only work in one direction and if you put them in backwards the lights will not work at all. The diodes cost about 10 cents each.

If you follow my recommendations and treat these globes with the utmost of respect you will have a very efficient, low power consumption (3W per globe) lighting system, well suited to a small energy system. The super Krypron globes cost $2.50 for a packet of two (not $2.50 each as stated in the story).

12V Bilge Pump

The last paragraph of my story **House water from a 12V bilge pump** in EG45 (page 17), states that it pumps at 100 litres per hour and consumes 3 amps when turned on. In fact it pumps at 400 gallons (about 1800 litres) per hour and consumes 5 amps when turned on.

The cost of $13.50 for the bilge pump was correct, but this was the price about four years ago and it is now almost double that figure.

Dear Readers,

My husband and I are at last in a financial position to seek an alternative lifestyle. Philip is a carpenter and I am a registered nurse. We have a problem in that we cannot decide exactly what would be the most suitable lifestyle for us and where we should move.

We think perhaps owning a small property to grow most of our own food and working part time is the answer. Also we would prefer to live near a community with young children as we have one son and hope to have more children.

We would be grateful if readers could write to us with some ideas and to tell us what they and people they know are doing and where they are doing it.

Sincerely. K. Nicholls, 16 Camille Street, Hallett Cove, SA, 5158.

Dear Irene & Keith,

Another year has rolled by. We are still working on our house in our 'spare-time'. We seem to spend more time earning the money then we do on our 'dream'. It's been almost four years now since the slab went down. I often think we will never make it, but we look around at what we have achieved in the time and it's quite remarkable. We are not doing too badly, I discovered that a lady I know has been living in their house for 18 years and it's still not finished, so there is hope for us yet.

We hope you keep the EGs coming. They have been so much help over the years. Your magazine is such an inspiration to so many.

Best wishes to you all for another year, Ann Botting, Jimboomba, Qld.

Dear Earth Garden friends,

I have been reading your magazine spasmodically over the past four years or so, enjoying it very much, but thinking the country life was out of my reach. Recently, my circumstances have changed a little and I am making some plans for the future which will include a place in the country (I hope!)

I would like to thank you and your assistants for the consistently useful, friendly and inspiring contribution you have made to the changing lifestyle of city people who want to "go bush". I have your HARD-TIMES HANDBOOK and have put several ideas and recipes to use in the city.

Yours, Margaret Ellerman, Box Hill North, Victoria.

earth people write

Dear Folks,

Is there anyone out there who has a proven method of power generation in operation? We have a property at Nymboida with white water river frontage and plant to generate our own electricity. The river flows constantly (and also floods). Has anyone used either floating or underwater wheels or a Pelton wheel in a fast-flowing river and what results were obtained? We had hoped to run a water pump from the power source as well as generated electricity for three houses and a workshed. We also have high ridge area where a wind generator may be used and information would be most welcome.

If any readers are looking for a cheap all-weather tractor we may be able to help. We have a Ransom Crawler (tank tracked) tractor for sale at $1,100. It will tow a trailer, snig logs and work in very small places, being only 3ft high, 3ft wide and 5ft long. Could suit a grape or kiwi fruit grower or small crop farmer. We have an owners and parts manual.

Thanks for your ongoing reservoir of good ideas and information.

Dan & Mos Callaghan, 'Lothlorien', Pacific Highway, Woolgoolga, via Coffs Harbour, NSW, 2456. Phone (066) 54 2108.

Dear Dan & Mos — **We are including a section on water power for home electricity in 'Energy Works!' Our book on home energy systems to be published late this year or early in 1985 by Nelson Publishers. We hope readers will be able to help you and of course we are keen to publish articles on small scale energy systems in Earth Garden, too! Meanwhile, methods of shifting water were covered in 'Waterworks' (Earth Garden 45) and Robert Martin has details of his water wheel pump on page 12 of this issue — Irene & Keith.**

Dear Friends,

We the residents of Mt Oak Community, are collecting our history for publication. If you were at Mt Oak, site of the **Down to Earth Confest** at Bredbo, NSW, 1977-78, and have any photographs or tapes we could borrow to copy, or information, recollections or opinions to offer, we would be very grateful to receive them. All material will be returned in original condition if requested.

Please send to Mt Oak Community, C/-Uta Conway, PO Box 849, Cooma, NSW, 2630.

Dear Keith & Irene,

I would like to congratulate you both on the consistant quality of the information and layout of **Earth Garden.**

After getting all the back issues, I have succeeded in working my way through them up to No 34 at the moment, still some distance to go to get up to date. At this time I am in the process of shifting house and transplanting some veges (tomatoes, capsicums and celery) and hope they keep growing.

I also have a 1 hectare block of land at Laidley, about 80 km from Brisbane on which I am trying to get a shelter (shed or garage) so that I can say goodbye to landlords and dead rent money as well as the city filth, although I will probably have to continue working here till I pay for the land. In time, hopefully, I can get a garden going and use available solar and wind technologies for power and hot water.

Keep up the good work with Earth Garden. May it continue to flourish and help people to realise that you can't keep taking everything out without putting something back.

Many thanks, Ernest Turnbull, Goodna, Qld.

Dear Friends,

First worthwhile rain in months! Frantically busy planting broad beans, peas, onions, etc. Too many jobs, not enough daylight.

An Exhausted Subscriber, Sheila Carron, Wooroloo, Western Australia.

Dear Irene & Keith,

Do any of your readers know a good and effective way to get rid of millipedes? I found a nest and poured boiling water over it. This did the trick, but what about the rest running around the garden?

Please can you run an article on Guinea fowls in the garden. How good are they for pest control, etc?.

Thanking you, Mrs Siegluide Schifferdecker, Figtree, NSW.

Dear friend,

We did run a small article on raising Guinea fowl back in 1974 in Earth Garden No 10 (page 14). It's true that Guineas range far in search of insects, but they will scratch up your garden at the same time! Nictotine spray will kill millipedes, but we don't recommend it as, though 'natural', it is a harsh, non-selective insecticide which kills beneficial insects as well as pests. We'd be interested to hear from readers on both subjects — Keith and Irene.

Dear Keith and Irene,

I am a new found fan of your **Earth Garden** magazine as a result of health problems which fortunately led me on a path of more natural and healthy living. Individual articles in just one of your issues have already been most enlightening and helpful.

Many thanks, Carey Gibbons, Rottnest Island, Western Australia.

We'll make it!

WOOTTON, NSW

By Jackie Byles

Today is winter solstice, it is also a day of strong, cold winds and rain. I look outside at the trees bending and swaying and the rain beating against the windows and I think to myself "We'll make it."

Since March we have been living on our land, 10 beautiful, hilly, well-treed acres.

Our home is a little primitive to say the least. The boys, Shane 19, Matthew 16 and Alex 12, share a caravan. Steven 20, lives away and loves the surf. Our kitchen-dining area is a 12ft x 12ft shed of recycled timber built on bush poles on the slope of the hill.

My bedroom is a tent, made of saplings bent over and joined by fishing line with a heavy tarpaulin over the sapling frame. It looks a little like an igloo (or a boa constrictor that has swallowed an elephant), but it's cosy and that's what matters.

Our cooking service is outdoors, an old fuel stove which cost the princely sum of $5.00 and works like a beauty. Later the gas stove indoors will be connected and definitely used on wet days. The area for washing dishes and people is outside, as is the loo. The loo, I feel, is quite posh, as on a sunny day it boasts heated seat, though on wet days you might prefer not to sit on it.

The chooks have graduated to the new chook pen and as a reward for our efforts, they have decided to supply us with eggs again, at last.

Our new calf grows rapidly and is a real Miss Personality. Her Mum, a lovely Jersey, is most patient with the calf, as well as with me. Still, I feel almost "professional" with the milking these days. After a five minute lesson last July, followed by the arrival of a cow and "You're on your own kid", one discovers that experience is, indeed, the best teacher.

We are clearing by hand and slowly the battle of the bracken looks like being won. The garden is coming together. Ample cow and chook manure helps. The bulbs I planted tentatively peep through the soil, though they seem a little undecided about it all on bleak days.

At times we've been without water and at times we have had too much, like when the roof leaked and for 14 days it seemed wetter indoors than out, until at last it dried up enough to fix the leaks. We have probably used every conceivable word playing *Scrabble* at night and gone broke in *Monopoly.*

As the older boys come and go, it's mostly just me, the 12-year-old, four dogs, two cats, two geese, one cow and calf, one neurotic rooster and his ladies and a duck. There are occasional nocturnal visits by a fearless possum who has discovered it's a good place to get a free carrot, which he takes from our hands. He also seems to like playing slippery slides down the sides of my tent, an unnecessary amusement, I feel, at 2 am!

Cooking outdoors is great but loses a lot of its charm in wet, cold weather, specially at night. Our lighting system is simply kero lamps, candles and torches. My very favourite things are the kero heater and my Mothers' Day gift from my youngest, a hot water bottle. Positive luxury.

Soon we will erect our yurt, one of the kit frames from **Gunningbar Yurtworks** (See story on page 10). We are doing the floor, cladding, roof, windows and doors, so we only bought the very basic frame. At present it looks like a jigsaw puzzle.

A constant inspiration for me in low times is Vic Calthorpe's story *It only happens to me,* in *Earth Garden 44,* where he turned all the negative actions into positive reactions. Thanks, Vic.

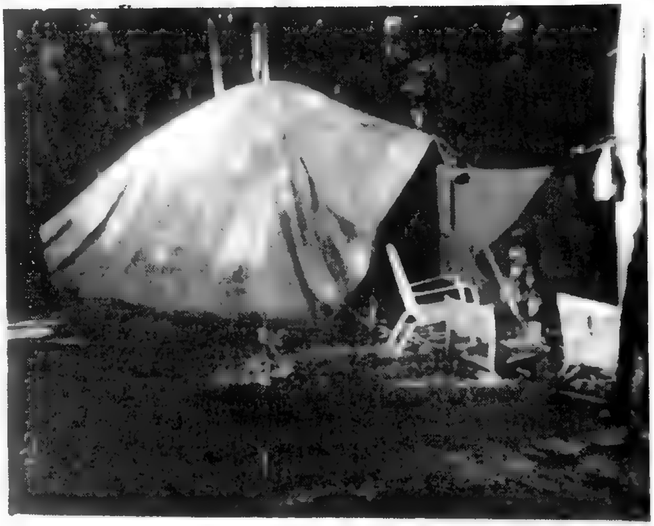
The bird life is fantastic here, very varied and most plentiful. The feeling, on a still, warm evening just has to be experienced to be understood. Since living here it has been a time of awareness of our abilities and limitations. I find it important to take time out from pursuing a goal, to take a rest and read a book of nonsense. Your mind needs to rest as well as your body.

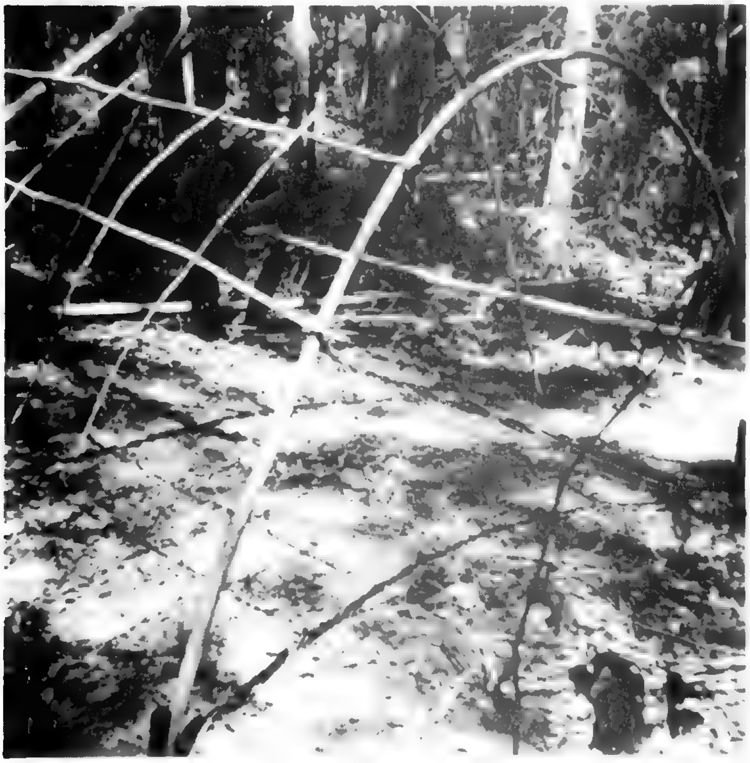
As I ask the cow to please not walk through my kitchen, or I rake the leaves from the floor around the stove, I think I won't be getting the Good Housekeeper of the Week Award; nor will I be worrying over spots on the polished floors or keeping up with the Joneses.

It certainly isn't an easy life, but it is a good life.

Opposite page: Jackie Byles in her igloo tent bedroom with her dog Penny Purple. This page, top: The shed kitchen and igloo tent. At right. The igloo outside with small storage tent. Below: Sapling frame of the igloo. One tarpaulin is placed over the frame and another tarp inside is joined onto the frame, so air flows through. A third tarp inside goes over the floorboards. Below, right: The $5.00 cooker in use.

"The tent igloo has full headroom and has not leaked at all through torrential rain and wild winds," says Jackie. "It will probably make a perfect sauna in summer, but I hope to be in the yurt by then!"





SOFT TARGETS

GREENHAM COMMON

By Sophie Masson

We walked up to the fence where a singing, dancing group of about 100 women were parading. They were holding hands and singing haunting songs, made up communally by the women.

'We don't want to die nuclear death/all together we are strong/break the nuclear chain . . .'

The song seemed to inspire them. They rushed at the fence and within a few seconds the gate was open and most of the surrounding fence was on the ground.

The British soldiers and hopelessly outnumbered police on the other side of the fence quickly radioed for reinforcements. Within 10 minutes a contingent of sleepy servicemen, some still in underpants and hastily buttoned shirts, and van loads of police, had arrived to restore the base to its former 'purity'.

The place, of course, was Greenham Common in Berkshire, England, where with my three-year-old daughter and two friends — and thousands of other women — I was spending a weekend in protest at the basing of the US first-strike *Cruise* missile at the Royal Air Force camp.

We had arrived very late and very tired on a Friday evening and stopped at Green Gate. The base has 19 gates in all, about six main gates, called disarmingly after the colours on the colour wheel we all learn about at school — Green, Yellow (a main gate), Blue, Red, Violet and Indigo (from which Cruise left the base, escorted in and out by British and US servicemen and where police activity was especially heavy).

Once inside the fence, the women made little effort to enter the base itself and dispersed of their own accord. It was nevertheless a Kafkaesque scene, the depressingly wet night highlighting the bleakness of the base, the high fences, soldiers in grim khaki shivering by their *Portakabin,* the weird shrill of the alarms and the gibbering radios on police motorbikes.

'Don't worry,' said one of my friends, 'it looks so sinister because of the weather. It won't look so bad in the morning.' I noticed that while everyone was busy tearing down the fence, two enterprising and practical people had taken the opportunity to cut out a large piece of wire, not as a souvenir, nor a symbol, but so that is could be used as a grill for the next day's campfire meal.

Indeed the next morning the view was somewhat different. True, the glimpse of the base beyond the high mesh fence and three rolls of barbed wire was hardly inspiring, but it did not look actively threatening. It merely looked boring. The soldiers walking up and down calling out friendly 'Good mornings' showed little hostility and the police presence, though larger than on the previous night, was non-committal.

The sun rose and began to dry the sodden Common, with its bright dots of tents and plastic-and-twig 'benders', from which women of all ages, shapes, colours and sartorial inclination emerged, rumpled from a night spent in them. Women sat on log seats nursing warm cups of tea while breakfast cooked over the fires. Mounted police began to arrive, mackintoshes spread out carefully over the horses' massive backs. My daughter was enchanted. She kept asking to 'pat the horsies', but I was wary, looking at the towering weight and size of them, fearing to encounter these beautiful beasts in a charge on a picket line.

There seemed to be little 'organised' activity. I had often been told of the structure of these 'sisters only' mass gatherings. Leaders as such are avoided. Where they crop up, it is usually only for a short time, to lead a song or gather a workshop together. Afterwards these people return to their individuality, though not anonymity; everyone tries to remember your name.

Despite this lack of organised leadership and consequent specific action (which would drive many men, and indeed women, mad), things do get done. Impulses are put into action and solidarity is shown silently by the people who turn up whenever something happens in a way which must be disconcerning for police and the soldiers who never know quite what to expect. It might be a dance on the silos, a fence torn down or simply a silent hand-holding gathering around the perimeter.

We took a walk around the fence — myself, my daughter and our (female) dog. It was decorated in places by streamers, balloons, pretty, colourful, shiny things and col-

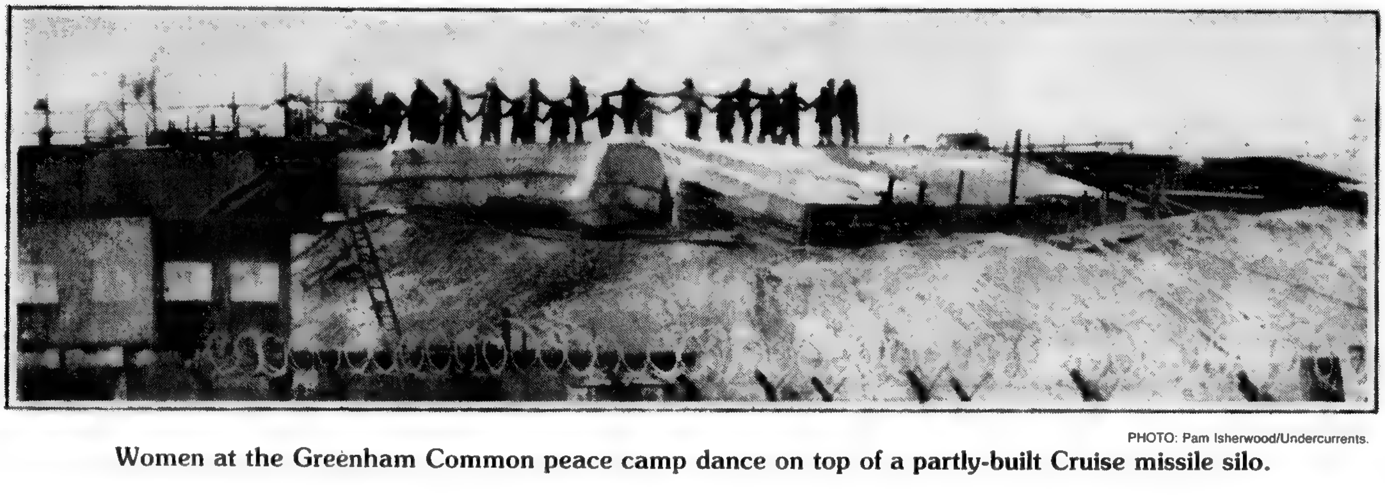


PHOTO: Pam Isherwood/Undercurrents.

Women at the Greenham Common peace camp dance on top of a partly-built Cruise missile silo.

lages of childrens' photos with the words *Soft Targets* written under them. The soldiers patrolling the fence were curious about any woman who walked past. One group of three young men, two with strong Northern accents and the other 'from South Wales', engaged a group of women in conversation.

They said they believed in what we were doing. 'But what can we do? We don't want to die nuclear death neither. If we'd known when we joined the RAF that we'd have to guard Yankee bases against our own women, we'd never have joined. We only did because there were no other jobs. What can you do in that case when you've got a family to support?'

Another soldier calls out: 'Can I have a badge, my daughter wants one?' and a woman mock-admonishes him 'Hey, that's submersive!' Another woman asks a soldier if he isn't bored. He grins and says: 'No, there's nothing boring about watching thousands of women walking up and down'.

It all seems very friendly, bantering and even flirtatious sometimes. If it weren't for the wire fences giving the weird impression of a zoo or a prison where the men are inside and the women looking in at the unhappy inmates, the conversations would seem like any 'normal' male-female exchange.

Further on a different note is struck. A couple of soldiers stride and swagger about calling out 'Baby, look we're macho men.' A lone soldier with a closed face ignores may daughter and I, greeting the dog with a defiant 'Hello, Boy. I stifle a grin but don't have the presence of mind to tell him of his mistake. Let the poor chap keep his illusions.

Back among the women music and non-violence workshops are being held. There is a vague impression of 'Girl Guide' sisterhood, of a communality which slightly embarrasses me. Most of the others have attended before, I am sure, and know the consciousness-raising songs and are attuned to the atmosphere which accompanies feminism and its undertakings. I am not accustomed to it, having never been a 'group' person, but preferring one-to-one situations. It seems to be an ideological mistake, but I am here in a very personal role. Perhaps the anarchy is useless because it dilutes the popular revolution, yet I can't feel at one with all of these people because of their sex and simply their sex.

Although I went there because I felt that, as an individual woman, I simply *had* to be there to affirm my stake in existence, I was not at all clear about priorities. That was difficult when everyone around me had different opinions as to why the camp was there at all and what they thought it would achieve.

For many of these people, *Cruise* and all other nuclear weapons have become the focal symbol of the system, in other words patriachy. Men were discouraged from taking part or even visiting by polite but firm handwritten notices at each of the camps, though their support in ferrying female relatives to and from and minding children was encouraged.

Some argued that it was strictly a womens' camp because, they claimed, all men, no matter who, are indirectly guilty to a greater or lesser extent of this potential crime against humanity. This seems to me to be an absurd chestnut, very much along the lines of hysterical American affirmation that all Russians want to destroy us. It also polarises humanity in a disturbing way and was all too good an excuse to hand to the establishment who could say that the camp at Greenham Common was one of the extremists, lesbians and man-haters in general.

The treatment of many of the residents of the Common by the largely male establishment, the police, much of the media and individual men, like one man at the main gate who constantly spat on the women's tents, did little to soften the anti-patriachal stance and was responsible for much of the extremism. But most of the women who came as short-stay or regular visitors came because of the weapons that were beyond the fences, the barbed wire and the soldiers, the all-powerful agents of our own insane self-destruction.

It is no good saying that all men are responsible. We all share the guilt. We all have to do something about it and not just sit on our hands and wait while trying to apportion blame.

However, there is an atmosphere at Greenham Common that is contagious, one of friendliness and toleration. Nobody forces you to be anything or to toe any sort of ideological line. For whatever reasons these diverse people came, they are all united because of that one thing which we can't see, nestling in its silo beyond the wire and the soldiers and the Americans, an obscenity none of us wants.

Hundreds of women gather silently, as if pied-pipered, at the fence at dusk. We all link arms and begin to chant a mantra. *Om,* the all-purpose hum, the energy of earth, fills the air. Everyone is serious, even the soldiers, whose faces bear disconcerted embarrassment or official poker stillness. They are not quite sure how to take it. The easy, casual friendliness of the day is gone. Then they contacted individuals and pleaded their case; now they are faced with a large group, committed to a reality they cannot afford to challenge on the other side — definitely on the other side — of that wretched wire.

The police are expecting a repeat of last night's fence-tearing. Their vans stand at the ready, blue lights whirring silently, faces expressionless. A song goes down the line, then hugs and kisses. The group disperses silently after each person deposits a small offering, a flower, ribbon, pine cone, leaf, anything, and we go to one of the clearings where noisy round games and songs are engaged in with great gusto. Women celebrate their potency, their power, laugh helplessly in rituals out of the sight of any authority figures. Despite the noise the police leave them alone.

It is no use going over the events of the next day, which did not differ much from the preceding one. It was an important weekend for me. I came back even fuller of the certainty that there are no certainties, that everything can be turned on its head, upside down, and still make the same sense, that there are no comforting 'baddies' or 'goodies', just a lot of fragile, fickle, bewildering and unpinnable human beings. The fragility frightens me now. It has made me more pessimistic about our future.

The big move

By Vicki Simmons

It's just over a year since I first wrote of my experiences with mudbrick building in **Earth Garden 43.** I have just read my article *(No more Mrs Suburbia)* for the first time since it was published and had a good old laugh. I said we should move in around July or August of 1984. Well, we were finally in by April 1985.

The house still isn't finished and probably never will be. It was so great to move out of the bungalow, though after 17 months. I really don't think I could have taken much more.

Our main problem, apart from lack of money (then both of us got jobs) and lack of time was the windows. We had heaps of oregon timber given to us so we could make them. Ross and a friend designed them and made up the frames, then another friend helped glaze and put them up. I oiled them all with linseed oil and turps. The end result is worth it, but is very time-consuming.

I think all-in-all, the windows for the whole house cost around $400-$500, including hinges, openers and so on. Practically the whole north side is windows. To buy these new we would have been up for $3,000-$4,000, so although it took us weeks to do, it saved us a lot of money.

The brick paving was also a time-consuming job. Most of the house, except wet areas, are paved, with the loungeroom still to be done, which is a major job. Of course, there is still a lot of other finishing off work to do. Ross has been working on and off for a while and when he does, work stops on the house. Most of the walls inside and out are now rendered. The interior walls are also done with **Bondcrete,** but I'm not very pleased with the look. I think we should have used muddy water instead of clean water with Boncrete.

I bought a **Stanley** slow combustion stove which is great, especially after cooking on two burners for so long. This also provides hot water in winter and is very economical to run. We also have a large pot belly stove for the loungeroom which isn't connected yet, but should be ample in winter. The house is surprisingly warm, though winter is just beginning as I write.

We use a solar water heater in summer. We had some problems with it at first, but I think we've solved them now. Our lights are all solar electric. We have six solar panels and 18 batteries, so we are surviving without the SEC.

The refrigerator and freezer both run on gas and both work fine.

All-in-all we've learnt a great deal while building our house over the last 18 months, but now we're in the house I can say it was worth it. I've learnt not to put a time limit on building. Something always goes wrong. We were silly enough to believe that we would finish in 3-6 months. There's always lack of money, lack of time, sickness and hundreds of other holdups.

Sometimes you feel that if you have to spend another day working on the house, you'll scream. If I'm in that sort of mood, I don't bother, because usually something goes wrong.

Costing is always a problem. We did our original costing, but of course our expenses are well over that. There are so many things you don't think of until you need them and it's all the little things that add up. We are just about down to our last dollar again, but we have no major outlay now, so we'll just plod along with what we've got. It's amazing how you can make do with other materials if you haven't got what you wanted originally.

My father-in-law has been great helping us out of a couple of financial pickles. Our friend Gary has also been a great help to us over the past few months. Thank you.

As I sit writing this, I look out the window and see all the animals grazing happily and all the coloured birds flying around and think how lovely it is here. Despite the hardships and disappointments, I've never once considered packing up and going back to Melbourne. One day in the city is enough for me.

For anyone who is thinking about moving away from the city, my advice is just do it. But remember, it's not all 'peaches and cream'. It's back-breaking and sometimes heart-breaking, but it is satisfying and, in the long run, well worth it. Thanks to Keith and Irene for their magazines which I read over and over, especially when I'm feeling down.

SUPPORT THE KIWIS

By Jack Coles, Yandina, Qld

Many people sympathetic to the anti-nuclear cause have sought to demonstrate support for New Zealand's courageous stance in tangible ways.

This can be done by visiting New Zealand as a tourist or, where appropriate to life style, by purchasing their exports to Australia.

Here is a partial list of products from New Zealand:

FOOD

Biscuits (Griffins, Joyce Landers, Kohi), honey (various brands), fresh fruit (kiwifruit, stone fruit in season, blueberries, strawberries), frozen fruit (Chef's Pride), canned fruit (Gales), meat (beef and venison), oysters, cakes (Earnest Adams, KJ Ginger Kisses), cheese (Mainland, Epicure), fresh and frozen fish (sea perch, sole, smoked salmon), chocolates (Van Camp), pate (Locklands), mussels (Kiwi Clams).

BEVERAGES

Steinlager beer, wine (Corban's Montana, Cook's).

OTHER PRODUCTS

Tullen's kitchen snips, refrigerators, dishwashers (Kelvinator, etc), various wooden kitchen utensils, timber, carpets (Teltex, URB, Bremworth, Sallee), toothpaste (Aim), workwear (overalls, etc), houses (Lockwood), leather garments and apparel, Woolrest sleepers, spinning wheels and handicraft equipment, knitting wool, CKD furniture (pine and other), laminated timber forms and beams, kayaks and canoes, wet weather apparel, yacht spars, rigging and sails, kitchen strainers, chocolate making equipment, greeting cards and paper, Butynol pool material, wallpaper (Blume), furnishing fabrics (Maurice, Kain), agricultural machinery (various), Canterbury sportswear, computer paper, safety equipment (clothing, goggles), sheepskin coats, boots, rugs, car seat covers, toys, spinning wools and yarns, demountable agricultural sheds, yachts, chandlery, boat winches, life jackets and sailboard accessories.

Pigeon pea

PIGEON PEA (Cajanus cajan)

By David King

The Pigeon pea is probably African in origin. Seeds have been found in Egyptian tombs of the XIIth Dynasty and it was cultivated in the Nile Delta before 2,000 B.C. Other common names of this wonderful species include Red gram, Congo pea and No-Eye pea.

Today India produces 90 per cent of the world's crop, with over 2.3 million hectares in cultivation, largely to make *dahl*. In the West Indies, the green seeds are eaten as a popular vegetable, which is canned in Puerto Rico and Trinidad.

There are many cultivars, and the plants are self and cross pollinators. In my garden we have varieties with five, seven of nine pods. Pigeon pea is drought-resistant, having a taproot, and will yield even with a rainfall of 400mm annually. Soil type is not important, but poor drainage shortens the life of the plant due to Fusarium wilt, which quickly kills it. Pigeon pea will not tolerate severe frosts or constant salt spray, though it is generally an easy plant to grow.

A tall growing perennial shrub (3-5m), living up to six years, it should be planted in-situ. Make a hole with your finger and drop in the seed. In very compacted soil a hole made with a crowbar will speed up growth. Propagation can be made from cuttings, but I've never bothered, as germination rates are very high.

The plants are legumes that nodulate freely and in my experience do not need innoculation. Tip pruning when the plants are 40cm high is advisable to promote side branches. Further tip pruning can be carried out with scattered plants to bush them out. Rainfall is sufficient, so no extra watering is needed, nor do the plants require compost or fertilisers.

It is best to harvest dried peas at a dry time of the year to avoid mould that can grow on the seeds. In my location (far north coast of New South Wales), this can be achieved by planting in December and January, which allows harvesting in October and November. The dried pods can be shelled while you listen to the radio with any damaged seed fed to the chooks and the pods composted.

Main pests are the Heliothos worm and a large weevil, but these do little damage and I've never needed to take any precautions.

Averaging 22 per cent protein and 57 per cent carbohydrate, dried pigeon peas are a valuable crop for self-sufficiency. The green peas, containing a lot more water, have protien content of 7 per cent and carbohydrate at 20 per cent as well as Vitamin C, which is lacking in the dried peas. Both green and dried peas are a good source of calcium.

Shelled dried peas should be spread in the sun for an hour or so before storing in glass screwtop jars. A light steam is all that is needed to cook green pigeon peas and the dried peas can be soaked overnight, then boiled and simmered for an hour, or 10-15 minutes in the pressure cooker. They can be mashed for patties, served whole with a little soy sauce, curried or added to other dishes. The taste of the cooked dried peas is something of a cross between chickpeas and lentils.

I've grown soybeans which contain a similar amount of protein, but only with only two peas to the pod, lower yield, annual planting and which are difficult to shell and cook. I've given them away. After the main harvest of pods, pigeon pea bushes can be pruned back to about 20-40 cm above ground and the considerable residue used as a mulch around fruit trees. To prevent re-sprouting if you no longer want the bush, cut it off at ground level.

Pigeon pea bushes should be included in poultry forage yards and can be used to feed goats and cattle either as browse or cut from a separate plot. In coastal areas rip lines in pasture can be planted with seeds and locked up for nine months to allow bushes to mature. After a slow start (three months), rapid growth follows. Re-sprouting is also rapid.

As green manure a thick stand of pigeon pea will shade out most weeds. Planted in rows they can be used to trellis curcubits, passionfruit and other short-term vine crops.

The most valuable use I've made of them is to aid in establishing fruit trees. Citrus, carambola, avocados and lychee all benefit by being planted in the centre of a circle of pigeon pea bushes. It looks better than hessian-and-stake protection and improves the soil for future growth of the tree. As a wind break around vegetable gardens the plant is ideal. It is not a surface feeder and you can plant close to it. Pigeon pea could also be interplanted in permanent windbreaks.

I've planted over 200 bushes and plan to put in more pigeon peas. Everywhere there is a gap, I pop them in.

☐Seed in packets is available from Phoenix Seeds, PO Box 9, Stanley, Tasmania, 7331, or in bulk from Norco Co-op, Lismore, NSW.

A living from the land

By Jacqueline French

SHEEP AND PUMPKINS

One of the challenges of farming small areas intensively is trying to find multiple uses for each piece of land.

Vegetables grow between fruit trees, for example, chooks scratch through potato and broad bean crops, parsely grows beneath the kiwi fruit vines and sheep run in the orchards.

Sheep are fine in orchards as long as the trees are dormant, too high from them to reach the foliage, or well netted. We use a combination of the three.

One orchard area has only deciduous trees where the sheep graze only in winter; these are young fruit trees without nets. Hopefully in five years or so they will be too high for the sheep to damage except in the picking season when the branches are weighed down by fruit. Dream on! We're probably in for another drought and the whole caboodle will slowly sink into the ground, or the neighbour's goats will get loose again.

In our other orchards the trees are either out of reach of protected by wire guards from wallabies and rabbits as well as sheep. The tree guards we use are initially time-consuming, but cheap (well, free) and maintenance is low. Each tree is circled by two old car tyres. These also keep down weeds, keep mulch away from the tree trunks and help moisture retention.

Around these tyres we place a guard of old fence wire, one or two widths high. We have a lot of old fences gradually merging with the undergrowth and using them for tree guards adds to our incentive to remove them before they join force with the blackberries.

Fences and backberries are good allies, You can't slash down the blackberries because the fence gets in the way and fence clearing becomes a labour of hacking through the jungle, requiring much patience and protective clothing (not to mention iodine), or efficient mechanisation like a large tractor or a small bulldozer. You're still left with piles of old fencing wire, festooned with blackberry canes, every thorn intact. It's tempting to leave the entire mess in a neglected heap until it is covered with new blackberries and the whole enterprise begins again.

Back to the sheep. The question came up last year of what else could be done with those areas between the trees where the sheep were grazing?

The obvious answer, of course, is to grow a nice nitrogen-fixing crop like lucerne and to stock more sheep. The drawback to that is that sheep cost money and don't start to bring in any money for some time and at the moment we're more interested in income than outlay. Also, some orchard-cum sheep areas are too steep for ploughing. One good rain at the wrong time and most of the topsoil would be at the bottom of the hill. Yes, we could terrace the lot, given patience, sweat and a few generations, but we probably won't get around to it for the next decade or so.

This season, however, we came up with one solution — a trial plot of pumpkins, growing in small piles of compost on top of the grass. Every couple of yards I placed a spadeful of compost, stuck in a pumpkin seed and watered.

Well, it worked. The pumpkins got enough of a start in the compost to compete with the grass, helped along with two top dressings of old hen manure. The sheep carefully nibbled the grass as short as possible round the pumpkin vine, encouraged by a lush grass growth from the extra feeding and watering. The result is a crop of pumpkins (I hope — they're not yet fully mature) with no loss of grass to the sheep. I suspect that we'd have got more pumpkins growing them conventionally, but quite a lot of fruit has set nonetheless. Of course the sheep dung is nicely spread about under the vines.

Young cauliflowers interplanted with beans which are being picked by Edward (at left). A pile of mulch is in the right foreground.

Next summer we'll try it on a larger scale, perhaps over a couple of hectares, depending on how the compost making goes this winter. Our trial has been minimum cost, minimum cultivation, minimum work (apart from the compost making) and has minimal impact on the steep slope. While not exactly maximising profit, it has returned more money from the area than we would have realised otherwise.

Sheep, by the way, seem to have varying tastes, according to their breed. For years we grew spuds which were untouched by any animal, not wombats, wallabies, horses, sheep nor roos, not counting a goanna which dug up the seed potatoes in case they were eggs (it took her a whole row to decide they weren't). Then we got Tukidale sheep, which munched their way through a hectare of potatoes in 10 days, with occasional breaks for other sustenance, before we could get some wire in to fence them out.

Tukidale sheep just shorn.

I waited a few weeks for them to show signs of imminent disease — the sheep I mean, not the potatoes, which never fully regained their former vigour and were sold at a large though unplanned profit as new potatoes at a time when large spuds were $4 the sackful. Potato plants are poisonous, but that was a year ago and the sheep are still tubby, bouncy and incorrigible. Fortunately they don't eat pumpkins.

CAULIFLOWERS AND CATERPILLARS

At the moment there are 2,000 cauliflowers growing serenely in one of our main vegetable areas, give or take a couple that our two-year-old sat on while he was picking beans between the rows.

Above the caulies are a small flock of cabbage moth butterflies, laying eggs with dedication. On the caulies their offspring are busy eating, doing considerably more damage than ours.

So far, however, we've used no pesticide, organic or poisonous, and the crop still looks quite saleable. As we go through the rows picking beans we also pick off the odd caterpillar. Far more caterpillars have been harvested by wasps and yellow robins and possibly by other insects or birds that I haven't spotted doing it yet.

It's quite possible to grow crops without pesticides — hundreds of organic farmers do so throughout Australia. If it wasn't possible, our pre-pesticide ancestors would have starved. Plants fruit and seed very nicely, thank you, without human intervention and any plague is food for someone else. Ibis feed happily on wingless grasshoppers, but conventional 'wisdom' is still to spray the grasshoppers (which does no good at all to the ibis), instead of investigating an ibis breeding programme.

When pests attack our 2,000 cauliflowers we have several choices. Conventionally, we'd spray regularly with a recommended pesticide. Apart from possible damage to ourselves (and farmers have one of the highest disease rates in Australia), the consumers of the cauliflowers and the passive recipients of the pesticide in the surrounding ecosystem, this would mean no tasty caterpillars to lure the yellow robins and the wasps.

In practice, a few caterpillars would survive to be eaten, to the detriment of their predators, so we would have to keep on spraying.

Or we could use an 'organic' formula, like Derris dust, which breaks down quickly and (reputedly) harmlessly, but still isn't much chop for the caterpillar predators. Or we can go on doing what we are doing, keeping the caulies growing strongly, pampering them with hen manure, mulch and tender watering and picking off the odd caterpillar, while keeping Derris in reserve and preserving the habitat of the yellow robins.

Unfortunately, this advice may not be much use in a suburban garden, where neighbours have a tendency to spray every insect in sight, including wasps, to prefer lawn to bushes and to keep hordes of bird-ensnaring moggies (cats to you). There are ways, though, to keep your caulies (or cabbages, Brussels sprouts or broccoli) without resorting to the hardware shelves.

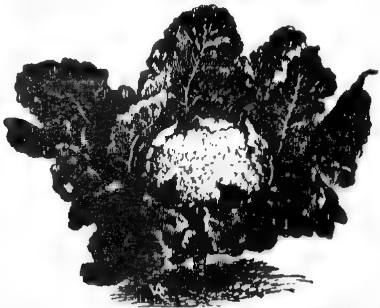
1. Pick off the caterpillars by hand. Even if your whole backyard is packed with brassicas (we all have our own strange preferences), it will take a surprisingly short time. Institute a family Saturday afternoon bug-squashing. It's quite cathartic.
2. Plant empty eggshells, dome side up, around your plot. The theory is that the white splotches scattered through the garden confuse the butterflies into thinking that there's a population explosion and they shun your vegetable plot for breeding grounds anew.
3. Use Dipel, a form of caterpillar bacterial warfare, or Derris, if you must. If you use Derris, make sure you wash the plants well before eating. Some of the powder can be caught between the leaves as they grow and won't do your insides any good.

Wasps are among the most valuable carnivores in the vegie patch. This wasp is eating a spider.

LIQUID MANURE

To make a homemade liquid manure, dump your weeds and green leafy garbage and any off manure you have hanging about the place (but not human, cat, dog or pig: the disease risk is rather strong) into a barrel or container with a close-fitting lid (unless you have noseless neighbours). This stuff can pong quite a bit if disturbed.

Cover with water, leave three weeks and ladle the water onto your garden. Very effective.



4. Or brew your own poison instead of buying it, by boiling up old cigarette butts, about a cupful to 2 litres of water and simmering for about 10 minutes. It will be lethal to humans, cats, caterpillars and robins, but it breaks down quite quickly and your caulies will be quite safe to eat a couple of weeks later.

5. One other recommended method of growing pest-free cauliflowers is companion planting, which I've tried, but without much success. Simply scatter the caulies through your garden, in the marigolds and under the nasturtiums, a sort of hide-and-seek game with the butterflies. I've decided that the cabbage butterflies are more persistent than I am, but you may be more successful.

The main thing is to keep the plants outgrowing the ravages of the caterpillars. Don't starve them or assume that cold weather means they don't need watering. On the contrary. Pile on compost, or old grass clippings or sawdust or rotten hay. These materials help to keep the temperature and moisture levels more constant and provide nutrients as they decay.

If you haven't got any compost and like most of us didn't prepare the soil properly before you planted your seedlings into a bed that will probably starve them slowly into a stunted adulthood, give them a push towards a brighter future with a top dressing of blood and bone, well decayed hen manure, seaweed spray or a liquid manure.

You can do it yourself, home fertilised, home grown and home protected produce. Food growing need not be associated with nursery shelves, fertiliser factories and pesticide distributors. Pick off the caterpillars, hide the caulies and keep the crop growing. Or, like me, plan for a lazy future. Plant some native shrubs, boot out the cat and wait for the birds to do the job for you.

Jaqueline French is attempting to wrest a living from the land by growing fruit and vegetables without poisons on her farm in the southern tablelands of New South Wales (see *Farming with wildlife* in Earth Garden 43). She somehow also finds time to edit *Natural Growing*, the excellent quarterly journal of the Henry Doubleday Research Association ($10.00 annual membership, from 'Sahara Farm', Robson Road, Kenthurst, NSW, 2154).

By Greg Baker

Few of us who keep bees as a sideline really need much labour-saving equipment. Some jobs aren't often enough or for long enough each time to be worth having special machinery.

However, if we can quickly, cheaply and easily make equipment that will improve the quality of the work we do, then the story may be different. These two items should fit that bill. One is a device for tensioning frame wire and the other a foundation embedder.

Wire Tensioner

The frame wire tensioner uses a piece of flat board about 30 cm by 100 cm, other pieces of timber or galvanised iron as shown in the illustration, spools (cotton reels will do) and a rubber-footed door holder.

Materials and construction technique vary depending on the frame size and what you have in the shed or under the house, or wherever you have your heap of materials (it's about time you went through the lot anyway, think of the fire hazard).

To build the device, put a frame flat on the board and work around it so that you can get the dimensions right. Start with the masonite under the cut-out frame ends so that the frame lies horizontal. Then attach the other piece of timber on three sides of the frame to hold it in place. The door holder should be placed so that when "off" it is clear of the frame and when "on" is able to bend the side bar about 10mm inwards. The timber behind the door holder is used as a stop to prise against when putting the door holder "on".

Cut the wire spool holder from heavy galvanised iron or thin timber. A bolt or nail will do for an axle. Some way to stop the wire spool unravelling is a good idea. We rest a piece of steel plate on ours. A permanently attached spring device would be neater. A rat-trap with a flat piece of board wired to the crusher would do the job.

To wire a frame, lace the wire through as in the diagram. The cotton reel allows free running of the wire. Tack two 5mm tacks or flathead nails into the side of the frame where the wire will be secured. Wrap the free end of the wire around its tack a few times, drive the tack home and snip off any projecting wire end.

While you're driving nails, put a couple of 20mm nails through the top of the side bar securing it to the top bar. This will help to keep the frame together when they're stuck up with propolis and you're inspecting hives. It's annoying to tear the top bar off, leaving the rest of the frame in place. Mind you, it's even more annoying to pull it off when it is nailed like this!

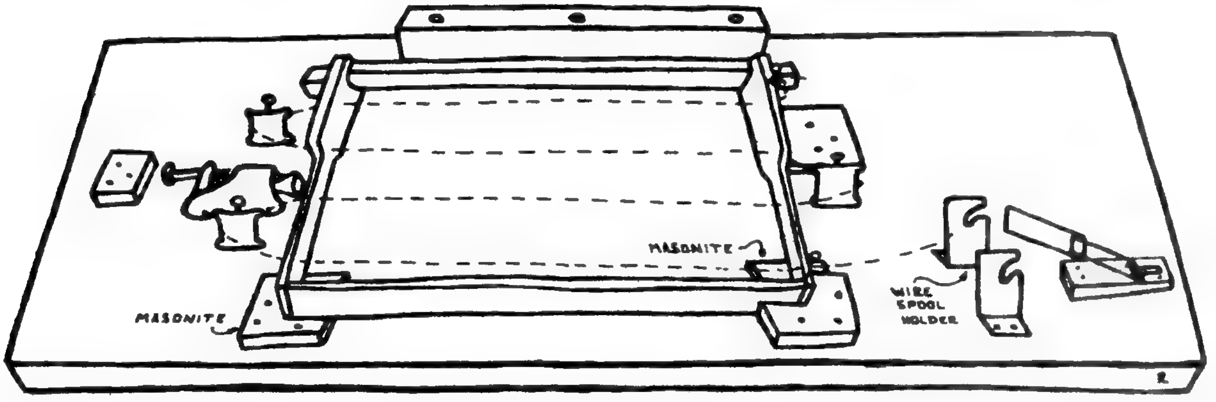
Now use the door holder to bend the side bar inwards. Push the bar as far as you can without breaking it. Experience and a few broken bars will show how far you can go.

Use a pair of pliers to tighten the wire one length across the frame at a time, dropping the wire off the cotton reels as you go. To get good tension use the pliers as a lever against the side of the frame. The wire will tend to cut into the frame at the holes but this will help to hold the wire tight while you're finishing. When you have finished the last length, secure the wire as you did at the beginning. Cut the wire close to the tack and undo the door holder. The frame will spring back into shape and the wire will become taut and far tighter than you could ever get it by hand.

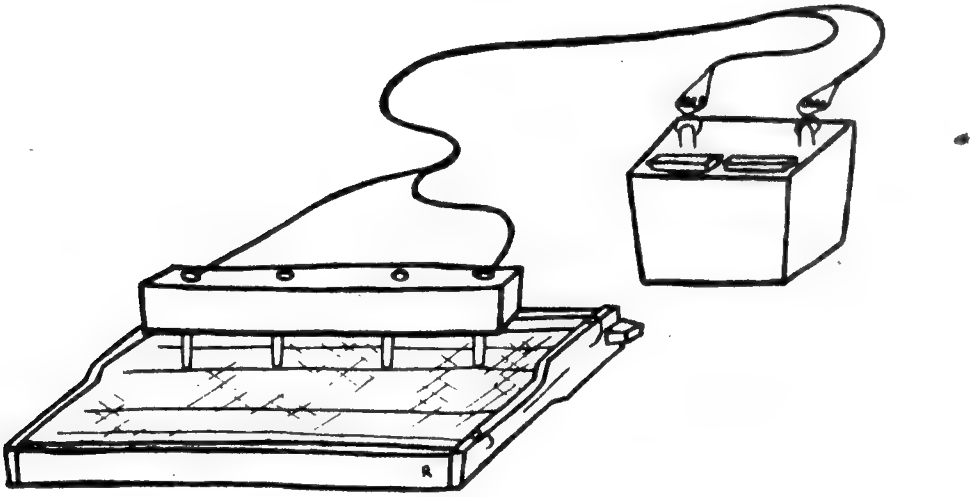
Embedder

Once the frames are wired they need properly secured foundation. If the foundation sags out of position, taking frames out of the hive to look at them and un-capping for

TWO BEE TOOLS



Drawings by Robin Jean



extraction of honey will both be difficult.

The best way to embed foundation is to pass an electric current through the wire and melt it in the centre of the foundation. Use the embedding tool for this job.

All you need is a piece of softwood very roughly 50mm by 25mm and a bit longer than the foundation, four 75mm flathead nails, 2 metres or so of two-core electrical flex, two alligator clips and a piece of board about 20mm thick and as long and as wide as a sheet of foundation.

Drive the four nails, equally spaced, straight through the softwood so that the points project through and end up in a straight line. Wrap the two wires of the flex around the two outer most nails before you drive them home and make sure these two nails are apart just less than the length of a sheet of foundation.

File the points of the nails flat and make sure the filed ends are in a straight line. You may need to bend some of the nails with a pair of pliers and file any end up longer than they should be.

When you're finished the construction, put alligator clips on the other ends of the two wires. Connect them to a car battery and put it aside, making sure not to touch the two end nails on anything metallic.

To get the foundation into the frame, turn the frame upside down and pull the foundation down through the wires, interlacing it through the wires. Interlacing is not essential, but it does hold it all in place while you're embedding. Poke the foundation into the slot in the top bar.

Lay the frame and interlaced foundation down flat over the 20mm backing board. Place the nail at one end of the embedder at an end of one of the exposed wires. Lower the other end of the tool onto the wires, making sure the intermediate nails hold the wire firm against the foundation and backing board. Once the two end nails are on the wire, current will flow and the wire will heat up and cut into the foundation.

It needs very little time to embed: a second or less. So, put the tools on, watch and remove quickly. If you leave it on too long you'll cut the foundation in two. At 30 cents or so a sheet, it's best to err on the side of too little heat even if you have to redo it. With practice you'll know exactly how long it is needed.

Do the two wires exposed on one side, turn the frame over and do the other two. That's all.

If you find that you cannot manipulate the tool easily enough, you could put a switch in the circuit. With the switch off, carefully place the tool on the wire. Then turn the switch on for long enough to embed the foundation. Turn the switch off and remove the tool.

Computers when appropriate

Dear Keith and Irene,

We were very disturbed and a little dismayed at some of the comments contained in your editorial of **Earth Garden 46.** As long-time readers of EG and contributors of articles for the past five years, we have always felt that the unbiased objectivity was one of the best features of the magazine. Some of the basic tenets, including independence and self-reliance, are ideals espoused by all EG readers. It doesn't matter whether a reader uses candles for lighting or a fairly sophisticated hybrid power system such as ours — each of us in our own way is using technology, not abusing it.

No one objects to constructive criticism and exchanges of ideas, but such accusations of being 'trendy' or worse are just plain destructive and help no one. Everyone should have the right to live the lifestyle they want or feel comfortable with but at the same time should accept that others have the freedom to live in the way that suits them.

EG is nearly 50 issues young and we hope will continue for another 50 issues so therefore please readers, remember that our road is not always easy but as believers in the philosophy of self-reliance or alternative living we should present a united front to the world and never degenerate into polarised groups through bickering and unfounded accusations.

Peace and happiness, Chris, Rhonda, David and Jenni Martin, Coonabarabran, NSW.

Dear Keith & Irene,

I must offer a few words of sympathy. Over the past couple of years I have seen quite a few knee-jerk reactions to the ideas of combining computers with a semi self-sufficient lifestyle. I felt that the letter by Penelope and David Lea in **Earth Garden 46** (page 45) exhibited signs of being such a reaction.

Technology is not to blame for the mess that human civilisation gets itself into, it is the way we use technology that must be reappraised. The motor vehicle is not to be blamed for atmospheric pollution, but the use of fossil fuels can be. I would argue that by me sitting in my little house in the bush typing you this letter on my little computer powered by sun, wind and water and sometimes a little pedal power, I am not adversely affecting my immediate environment at all. On the other hand, most of the knockers of this silicon chip technology take their petrol-guzzling beasts with them everywhere they go.

I am not against motorised transport, I am only against transport powered by fossil fuels or fuels that pollute the environment. One should not point an accusing finger at anyone else unless your own backyard is cleaned up first. A vehicle running on methane gas, fuel alcohol, wood gas, vegetable oil or solar power is environmentally quite acceptable. Monoculture farming, pest control with poisonous chemicals and transport dependent on non-renewable energy sources are not acceptable (for life's sake).

Although I live far from the maddening crowds, I for one have not retreated from society. Cultures (Eastern and Western) have much to offer and it is only in areas where the technology or the lifestyle is inappropriate that society and I have parted company.

I would advise you to not necessarily drop the idea of having computer articles, but to include an article on computers only when it is appropriate. I do not accept that in an 'alternative lifestyle' computers are never appropriate. Many tasks, particularly those relating to communications and information sharing, can be done much more effectively and efficiently with the use of a relatively inexpensive computer system.

Nimbin is often regarded as the 'capital of alternative society' and here computers are playing an ever-increasing role in enhancing our communications skills. Our local alternative rag, the **Nimbin News,** is put together with the aid of a computer word processor and the mailout labels for the subscriptions are printed by computer. In Nimbin computers are used by various groups, including the RRTF (Rural Resettlement Task Force), AASC (Australian Association of Sustainable Communities), Tree Works (a reafforestation group), Bush Tracks (a bush recording studio) and the Nimbin Information and Neighbourhood Centre. All of these groups would see themselves as being involved with, or about, alternative lifestyles.

It is easy to make a useful gadget (such as a computer) into an obsession, but if it is not used for 'Star Wars' or in a way that could be seen as an invasion of privacy (and in comparison to the present day motor vehicle) I see it as being a relatively gentle obsession. Computers can make a laborious and boring task into a fast, simple and efficient one. With less time needed for repetitive mechanical chores we can spend more time doing things which we can enjoy.

Keep up the good work with your 'trendy' magazine. Hopefully you will be seen by mainstream society as a new trendsetter, otherwise our endeavours to demonstrate an appropriate lifestyle will have been in vain.

Peter van der Wyk, Nimbin Neighbourhood Centre, Nimbin, NSW.

Dear Keith and Irene,

We are reporting another change of address, hopefully this will last us for a while; long enough to see some herbs and vegies grow anyhow.

Many thanks for our EGs, which are a real joy. We're relieved though, that there's to be no more computer talk. We're just a couple of modern-day Luddites!

Love from Christine & Bill Pearse, North Bendigo, Victoria.

Dear Keith and Irene,

The standard and content of **Earth Garden** is most pleasing. I trust that the criticisms mentioned in EG46 (on page 45) will not cause complete abandonment of the subjects mentioned. It is not possible to please all readers at all times and whilst readers should practice tolerance, it should be remembered that moderation in all things is a good philosophy.

Kind regards, John Houston, Moulamein, NSW.

Melissa with her Dick Smith VZ-200 computer.

The electronic cottage

We have been swayed by Peter van der Wyk's suggestion in his letter (and support from other readers) that we should continue to run articles on computers in ***Earth Garden*** when they are appropriate. This article, adapted from the ***Homeworks*** section of our book ***Energy Works!*** (a practical guide to home energy systems), reflects our outlook on the uses of low voltage home computers outside the cities. The book will soon be published by Nelson Publishers. More details in ***EG48.***

Low voltage home computers

The combination of a 12V personal computer hooked up to a solar electric system can conquer the tyranny of distance and bring education, entertainment and communications to remote places. Why shouldn't country children be just as much at home with computers as city children?

The hardware: A number of computers will run on 9V or 12V, including the Australian-made Microbee, the Dick Smith VZ-200 and the NEC PC-8201 used by Peter van der Wyk with a solar panel (see **Peter's portable** in **Earth Garden 44**). These are all compact, lightweight portables with typewriter-like keyborads and built-in software programs. They usually incorporate a small liquid crystal display (LCD) screen or they may be connected to a 12V portable television set or monitor.

The power source for these machines may come from rechargeable nickel-cadmium batteries or from adapters which rectify mains power household 240V electricity into low voltage DC. These latter may simply be disconnected and the computer run direct from the batteries of your solar electric system. Some use cassette recorders to store memory and run games and other programs. Computer printouts are made on low voltage or battery-operated plotters and printers.

The more advanced and more expensive lap computers used by journalists have stronger memories (more Ks or kilobytes) and often include a modem (short for modulator/demodulator) for communications through the normal Telecom telephone lines. The Rolls Royce of these must be the beautifully designed disc-driven Apple IIc, which will run on a 12V battery pack and has an optional flip-up LCD. You can use it with a TV set or monitor to run Bank Street Writer, a word program designed for children, Print Shop, which has a range of types for printing greeting cards, or hundreds of other programs.

Two recent additions to the portable computer market are the Commodore C-16 (9V DC) and the more sophisticated, ultra-slim Toshiba T1100 (720K with a disc drive using nickel cadmium batteries).

Our daughter Melissa, aged 11, has a Dick Smith VZ-200, perhaps the cheapest computer system which easily adapts to a low voltage power supply without any extra circuitry. It draws only 1 amp. Melissa uses a portable colour TV set as a monitor and a data recorder which will run on 9V (though any good quality tape recorder would work). With it she can write small programs in BASIC, learn speed reading and play computer games like Hangman, Invaders and Super Snake.

With a 16K memory addition, the VZ-200 cost $300 in 1984 and is now priced at just $200 (minus the TV set). Melissa doesn't have a printer as she has the occasional use of **Earth Garden**'s 240V Apple Macintosh (on which this story is being written). Peter van der Wyk advises that a printer interface for the VZ-200 now costs about $32.00, a four-colour pen ploter is $99.00 and a word-processing program about $24.00. So for a further outlay of $155.00 you could run this little low voltage machine and make 'hard copies', for example, of club minutes and circulars, recipes, short stories, addresses, catalogue your books, keep an appointment diary or draw in colour.

Why get a computer? Computers can make your work easier and more efficent and it's never too late to learn how to use them. For children it's never too early.

Disabled people who cannot write can often use a computer, easily correcting mistakes as they go (so computers are enabling). Systems have been designed to do jobs like opening windows and switching on lights. People with poor vision car read large text on the screen and there are Braille programs with printers and speech synthesiser programs for the blind. Handicapped children can get a lot of fun from computers, joining in or just looking (a picture is worth a thousand words).

Education: Experimental lessons by computer (using modems) are being made on outback cattle stations hundreds of kilometres from schools, where the famous School of the Air radios (once run on pedal power) links pupils and teachers.

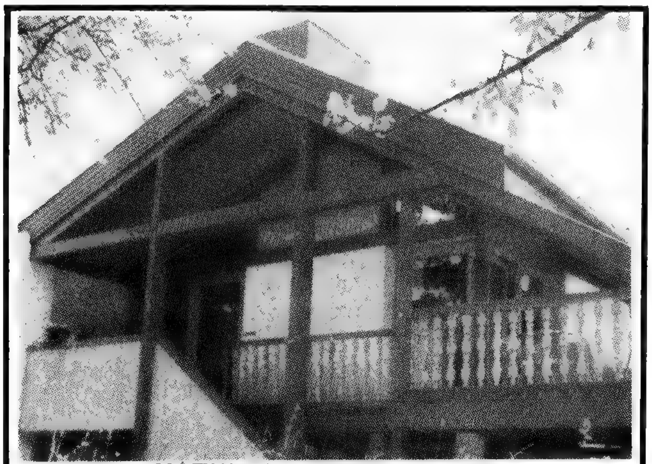
Computers quickly attract the interest of children and retain it, which is half the battle of teaching and learning. Kids respond with imagination to the computer language LOGO, which uses 'turtle' graphics or 'sprites' for drawing all kinds of shapes on the screen. Toddlers easily pick up letters of the alphabet and start building words. Simple programs soon have children playing tunes while they learn the basics of music. Typing and computer language commands are acquired almost unknowingly.

Entertainment: There's plenty of fun to be had with the wide range of computer games of all kinds and degrees of skill, from Invaders to Chess. They teach hand-eye co-ordination.

Communications: Where there are telephone lines it is possible to hook up the computer to a modem to send or receive messages and information anywhere in Australia or overseas.

There are dozens of other uses for computers, ranging through touch-typing, business account spreadsheets, creative design, to wine cellar or livestock-breeding records.

Computers are tools limited only by our own skill and imagination.



NATURAL TIMBER STAINS

Bio Products offers a range of natural paints, varnishes, lacquers, stains and polishes in a range of colours for use in finishing and preserving timber and for painting concrete, plaster and wallpaper. These products are based on natural raw materials like plants and trees, resins and waxes and herbal extracts.

They do not include synthetic pesticides, fungicides and insecticides, coal tar or solvents like benzene, toluene and napthenes and will not harm humans or animals. Write for colour chart and further information.

☐ **Bio Products Australia Pty Ltd,**
25 Aldgate Terrace, Bridgewater, SA 5155.

access

PERMACULTURE DESIGN COURSE

Upper Thora, NSW. Starts Sunday, November 17, 1985.

A 14 day intensive training course for people wishing to become permaculture consultants or designers will be conducted by Hans Erken of Mid North Coast Permaculture Consultancy. Fee of $450.00 includes food and accommodation. Child minding facilities for six hours of course lecture time per day for 12 days is also included in the price.

Write for registration and further information to **Permaculture Design Course,** C/- Homelands, Darkwood Road, Upper Thora, NSW 2454.

BOTANIC ARK NURSERY

Steve La Valley advises that the cost of the 1984-85 Botanic Ark Nursery Catalogue, recommended in Earth Garden 46 (page 53), is 50c in stamps, plus a large stamped, self-addressed envelope and not free as we stated. Also the nursery is open only on Sundays, or by appointment. Our apologies to Steve for these mistakes.

☐ **Botanic Ark Nursery,** Copeland Road, Warragul, Victoria 3820.

New Policy

PLEASE READ THIS CAREFULLY

These lines may change your life. Many people over the years have found their piece of Australia through Earth Garden's land lines.

To make things quicker and easier we have decided to charge a flat rate fee of $12 (prepaid) for each land line from now on. Maximum listing is 50 words, plus full name and address (compulsory) and phone number (optional).

Readers still have the responsibility to check all deals. This is not a lonely hearts column.

We are a couple with three young children seeking to purchase a property of approximately 30 to 100 acres within 100 km of Gembrook, Victoria. We would prefer a small farm containing a sizeable acreage of bush and access to a creek. An old farmhouse on the property would be an advantage (but not essential as we intend to build a mudbrick home). We would consider a joint purchase with others, provided conservation was a priority. We would also be interested in hearing from any Earth Gardeners in this region who are establishing themselves on the land and building in mudbricks.

Contact Andrew and Heather Djurovich, Lot 44, Monbulk Road, Emerald, Victoria, 3782. Phone (059) 68 4987.

We wish to sell the larger part of our irrigation farm in the Riverina, 6 km from Moulamein on the Edward River (permanent stream). There is a pumping licence (commercial) and riparian right (private use). Accommodation is a 27 ft caravan, plus an amenities van wth HWS, toilet and shower. Electricity is connected and there is a pressure pump for water supply. The soil will grow almost anything and there is plenty of sunlight. One-third is redgum forest, another third is laid out for flood irrigation. Total area 110 acres. Price $78,000. A smaller block is available for $26,000. All letters will be answered.

J. Houston, PO Box 75, Moulemain, NSW, 2739. Phone (058) 8741 and ask operator for 20.

land lines

There are six shares (six home sites) left on the community where I live. The other six are occupied by single adults (three men, three women and four kids: 10 of us). We want a family group (or groups) i.e., woman, man and their kids to come to live here with us and buy a share. We want people who are already happy and who would like to be happier, a couple with a strong commitment to each other and their relationship, people who are into personal growth, aware of the growth potential in accepting confrontation and in the resolving of conflicts inherent in interaction with others. We want people who know they can make dreams come true if they really want to. The property is very beautiful, 2.5km from Nimbin, a lovely walk, 26 hectares. Plenty of water.

Sincerely, Irene Herington, PO Nimbin, NSW, 2480.

A small community in a mountain valley near Deloraine, Tasmania, is looking for more members. The land is secluded and the area is not serviced by the HEC. We have a short but abundant growing period followed by a cold and wet winter. The land consists of 207 acres, two-thirds bush, the rest cleared land, with three permanent creeks. The community at present comprises six adults, one six-year-old (wanting company) and two babies. Price $4000 per adult.

If you are community-oriented and open to challenge, please contact Rosie Bickel, C/- PO Meander, Tasmania, 7304.

We have 150 hectares of beautiful land in the hills between Lismore and Murwillumbah, about 15 minutes from Nimbin and an hour from the coast. Overall the land is owned by an incorporated company, but each member has shares which gives entitlement to 2 ha (5 acres) for private use. Members share in another 60 ha which is available to all for recreation, forestry, agriculture, etc. There are swimming holes and a waterfall.

The basic framework of roads, dams and home sites is well under way and our initial membership has been established. We are now looking for more people to help us move into the next stage of our developing community, people who will respect this beautiful land as well as each other. The share price of $12,800 includes the completion of roads and dams and equipment to maintain them.

If this appeals to you, please write to: "Lillifield", Lillian Rock, via Nimbin, NSW, 2480, or phone (066) 89 7224.

For sale, sadly: 2 acres with renovated old schoolhouse in isolated sheep farming community south of Bathurst, NSW. House is very cosy, with phone, power, plumbing, fuel stove and Godwin wood heater. Herbs, fruit and nut trees planted. Prefer to sell to one or two women. Price $25,000.

Matilda, 4/54 Denison Road, Lewisham, NSW 2049. Phone (02) 569 2670.

Wanted — person or couple to live independently on land in return for caring for animals approx two nights per week. Will need van or tent. No power.

Contact J. Byles, 'Wongabeena', Newmans road, Wootton, NSW, 2423.

Kyogle. Ideal retreat, 100 acre property, Queensland-style homestead with 12ft verandahs. Fully equipped with solar, hydro and wood fuel alternative power systems. Springs, dams and 1 km creek frontage, northerly aspect, frost-free slopes. Established orchard and gardens. Magnificant stands of hardwood and rainforest, 40 acres pasture. Price $95,000.

Phone Robyn (066) 36 4252 or Gary (066) 36 4104 evenings, or write G. McIntosh, Roseberry Creek, Kyogle, NSW, 2474.

I have a property on the north-west coast of Tasmania which I am going to sell. It is situated in a quiet spot with a clean permanent stream running through the middle of the property. There is a lot of good fertile flat country and also some higher parts which are growing good grass. We have plenty of natural timber shelter areas. The two homes on the property are old, but they are warm and comfy. We do not have any problems with droughts, floods, fires or pollution. Property is approx 100 acres. We are asking $500 per acre. Come to Tasmania, you will love it.

Trevor Medwin, Forest, Tasmania 7330. Phone (004) 58 3119 (AH).

Are you interested in a tropical fruit paradise on approx 2 acres with water from permanent creeks? Some 58 varieties of Asian tropical fruit trees and spices, particularly those from Indonesia (including cashew, soursop, sapodilla, menteng, star apple loh, purut, mabolo, durian, cloves, Java plum, duku, ice cream bean, rambutan, salak, santol and kenanga to name a few), are established on the property which is close to a township, on highway, with power and phone available along boundary. A full list of trees planted is available. Would suit nurseryman or retired couple. Price $35,000 ono.

A. F. Siefken, Palmerston Highway, M.S. 216, Innisfail, Qld, 4860.

We want Earth Gardeners to know about a beautiful piece of land, 3/4 acre, which we have for sale in the tree-lined Huonbrook Valley near Mullumbimby, northern NSW. It is 15 minutes from the nearest town and 25 minutes from the beach on a sealed, all-weather road and has easy access, trees and gentle slopes. Soil is productive and well drained and the area has good rainfall.

Please ring Ian & Sandy Hodgkinson at (07) 356 6493, or write to 31 Hunter Street, Kelvin Grove, Qld, 4059.

Shares in vegetarian community of 700 acres, 2 acres homesite by the creek, coastal mountains, community market garden, lake, secluded, mostly bush. No animals or tobacco. Price $5,000, some terms.

Contact S. Kavanagh, QOA, Box 31, Nimmitabel, NSW 2631. Phone (0648) 8 5279.

For sale: Two 1/8th acres, 40 km north of Gympie near Gunalda, Queensland. Power and phone available, dirt road, partly fenced, secluded but accessible, 4 minutes drive to main road, sloping with good views and building sites, lovely trees and fertile soil. Price $13,000.

Vic and Helen Burman, 17 Winstanley Street, Chapman, ACT, 2611. Phone (062) 88 2103.

For sale: 68 acre freehold property near Kenilworth in the Queensland Sunshine Coast Hinterland. House sites prepared, spring water bore (1000 gal per hour) and 250,000 gal dam. Electricity and phone available, school bus at gate. Local town with all amenities and schools to grade 10, 8km away, 40 minutes to beaches and major town centre, two hours from Brisbane. The property is lightly wooded with boxwood and eucalypts on 30 acres with 30 acres of clear area around house site. Situated in a small valley overlooked by state forest. Full price $49,000.

For full details, contact David Poole, 69 Park Street, Kelvin Grove, Qld, 4059. Phone (07) 352 6143.

Seeking people on existing co-op, or hoping to establish along the lines of rebirthing and children's growth. We are a couple with two children, 6 and 4, with interests and skills of: macrobiotics, Chinese and Swedish massage, osteopathy, bio-energetics, Reichian therapy, Taoist and Hatha yoga, tai chi, Rajneesh, auric healing and all aspects of alternative building, energy systems and food production. We have up to $25,000 and seek a supportive group with enthusiasm for the future.

Bardall, 12 Fawcett Street, Brunswick Heads, NSW, 2483.

Cumnock, central west of NSW, 56 km from Orange and Wellington and 95 km from Dubbo. Renovated cottage of double brick and iron roof and new additions of Hardiplank. Three bedrooms, lounge room with open fire, dining and sunroom, facing north with gas heating, kitchen with huge pantry and fuel and electric stoves, laundry and bathroom with separate toilet. Off peak hot water system can be converted to solar. Complete house is insulated in roof and walls. There is a carport, plus a huge concrete floored shed (30 x 30) at the rear of the house. Town water is connected, with tank water for drinking. The house is in the village on the main road and would be ideal for toymakers, restaurant, etc. It is an attractive cottage with bullnose front verandah and a large garden. Price $35,000

Sylvia Gilmour, Obley Street, Cumnock, NSW, 2867. Phone (063) 67 7270.

We wish to sell 26 acres at Pacific Palms, 90 minutes north of Newcastle. Frost-free, sunny northerly aspect, just right for fruit trees and vegies. Handy to lakes, beaches, shops, schools. Lake and bush views. Gravity fed irrigation possible. Price $47,000, could finance.

Jim Lanham, phone (065) 54 4136, or write C/- PO Pacific Palms, NSW, 2482.

For Sale: Near Beaufort, Victoria, two blocks of land adjacent to an established group of four families with small children. The land adjoins State Forest and has bush, pasture, spectacular granite outcrops and awe-inspiring views. Price 38 acres, $22,000; 52 acres, $24,000.

Phone or write Kevin Parker or Joanna Simmonds, 67 Research-Warrandyte Road, Research, Victoria, 3095. Phone (03) 437 1943.

For sale: 100 acres, half an hour inland from Grafton, with cabin and large shed enclosing laundry-bathroom, plus vegetable garden and orchard. Land backs onto State Forest, has dam, waterfall and rainforest gullies and is heavily timbered. Price $45,000.

Lyall Burgoyne, Buccarumbi, via Grafton, NSW 2460. Phone: (066) 49 4165.

Land wanted, north-east NSW or south-east Queensland. Fairly conservative young couple (aged 33 and 28) with two sons (aged 8 and 3) seek land with idea of self-sufficient living, including livestock. Approx. 50 acres or will consider share of larger property within reasonable range of town and schools (or bus). No communes. Preferably with comfortable, energy efficient home, but not essential.

Please send all details to Haim and Susan Segal, 13 Darling Street, Waverley, NSW, 2024.

For sale. Handcrafted mud and timber house on Mt Warning, north NSW. Share includes building, over 100 fruit trees, two solar panels, generator, etc. Bordered by National Park. Our rainforest is a continuation of the park. Site is frost free with north-east aspect.

For more information, phone (066) 79 5306, or write John and Jennie Wickens, PO Box 512, Murwillumbah, NSW, 2484.

Outlook Farm in Kinglake, Victoria, is available to accommodate unemployed adults (over 18) who are genuinely keen to learn, practice or teach the basics of small-scale food production (including vegetables, fruit, grains, eggs and milk), building and carpentry, housekeeping and cooking, bookkeeping and the art of communal living, crafts and recreational activities. We have a very pleasant 35 square log building which is not quite finished (that's where the building and carpentry come in). This is surrounded by a 6 acre property which is still one-third bush and the whole is part of a rural community of 3000 people all surrounded by national parks.

The property is owned by a charitable trust which raised loans to start the project and residents are at present paying $36 a week to cover all their expenses — food, housekeeping and contributions to loan repayments. They are responsible for their own housekeeping, while two neighbouring directors keep an eye on things from the sidelines. Residents are expected to put in at least 20 hours a week on communal jobs. No illegal drugs or alcohol are permitted on the premises.

Ring or write for more information, or come and visit us sometime at Outlook Farm, Mount Slide Road, Kinglake, Victoria, 3763. Phone residence (057) 86 1514 or Helen Meggs (057) 86 1285.

Seven Hills, Sydney. Private sale of lovely older home on double block, subdivision available. Back and front verandahs, three large bedrooms (main room with mirrored built-ins), polished floors, double garage 24ft x 24ft are included with many extras. Entrances from two streets, front and rear. Price $85,000.

Estella Martin, James Street, Seven Hills, NSW 2147. Phone (02) 622 6896.

For sale: Alternative Queensland contemporary style handmade mudbrick house on 23 acres, half hour from Bundaberg, 10 minutes to Gin Gin. Two bedrooms, verandahs all round, timber floors, built-in cupboards including silky oak. Full amenities, power, phone, school bus, daily mail run. Two dams, three bores, 10,000 gal rainwater tanks, horse yards, garage and workshed. Numerous mature fruit and nut trees, herbs, extensive landcaped gardens 100% organically grown. Natural wildlife with many birds and parrots. Price $82,000 neg.

Phone (071) 77 4129, Doug and Sandra Steindl, Hermit's Rest, M.S.368, Gin Gin, Qld, 4671.

For sale: Northern Tablelands, NSW. Forest retreat with rustic handbuilt four bedroom house. Large fenced garden and nursery areas with reticulated water system. Good sheds and equipment. Two dams. No electricity. 141 acres of timbered high elevation mountain country, 30 minutes from Walcha. Suit people into plants and quiet lifestyle. Price $60,000.

Phone Sybil Free (062) 47 2076, or write Kevin Free, Geraldine Road, Walcha, NSW, 2354.

Blue Springs may be near Nimbin, but it is not like a 'hippie commune', in fact middle aged and middle income families and couples predominate. At $10,000 for 2 acres which includes roads, water supply, etc, the prospects of a low-cost living style are very good. There are 36 sites, 200 acres of common land, good volcanic soil and rights of re-sale.

Phone (066) 89 1388 for a viewing, or write to Old Butter Factory, Nimbin, NSW, 2480 for a brochure (Len Harper).

Shares at Pumpenbil in the beautiful Tweed Valley. Great Mt Warning views, many creek frontages, ranging from rainforest and timber to grazing land and light timber. Land is owned by a company of which each shareholder is a director. Shareholders have sole rights to their lots. All lots surveyed. Prices $14,000 to $18,000. Internal access roads and most legals included in cost.

Contact Mick Cahill, phone (066) 79 7184 or C/- PO Uki, NSW, 2484.

For sale: Stone house situated in Oatlands, Tasmania. Three bedrooms, formal lounge, dining/family room, kitchen bathroom and laundry, wood heating. On approx ⅓ acre, with two road frontages in the centre of town, well suited to commercial or craft outlet. Other structures include steel-framed double garage and barn. Asking $38,000, negotiable.

Bob & Margaret Riep, 12 Amiens Avenue, Moonah, Tasmania, 7009. Phone: (002) 72 8716.

63.5 ha secluded fertile valley with grassy flats and spring water. Peaceful off-road location, with access to central coast, 2 hours travel north of Sydney. Reluctantly for sale as a whole for $68,000, or as preferred half or multiple share 'tenants in common', realising $34,000 plus legal costs.

Phone Ross Howard (043) 53 2334 or 56 1012, or write RMB 1310, Yarramalong, NSW, 2259.

For sale: Tropical fruit orchard, five years old, 400 assorted bearing trees, with modern four-bedroom B/brick home on 10 acres. Deep red soil, two bores, rainwater tanks, all working machinery, 20 miles from Bundaberg. Price $120,000.

For full particulars, phone (071) 77 4226 evenings. Mrs R. Burns, 'Valley View', MS 368, Bungadoo Road, Gin Gin, Qld, 4671.

Mudbrick home on 20 acres. For sale, with additional three-roomed dwelling. Passive solar, stove, open fire, solar hot water, leadlight windows, wind and solar electricity. Forest, established native garden, pine nut and fruit orchards, all irrigated. Price $65,000 ONO.

Phone C. J. Spencer, (054) 38 3278, or write PO Box 21, Bridgewater, Victoria, 3516.

New land and community in Western Australia. A small group of people with vision are about to purchase an attractive 300 acre property south of Bunbury (south-west of WA) in order to establish a community based on caring, cooperation and commitment. You are invited to become a foundation shareholder. Provision will be made for individual dwellings and communal activities and facilities.

For further information, contact Gary & Bridget on (09) 271 5390, or Trish and Sasha on (097) 31 5248 (after hours), or write to PO Box 752, Bunbury, WA, 6230.

For sale: 18 acres, beach frontage, permanent creek flowing through middle of property, rich river flats, many native birds and animals, close to National Park. Price $30,000. Also 50 acres, adjoining National Park, rich river flats, delightful views. Price $35,000. Terms can be arranged.

Greg Rhodes, Box 124, Whitemark, Flinders Island, Tasmania, 7255.

Quarter share and equal directorship of company owner of land is available to a family intending to reside on the property of 46 hectares, 13km by sealed road from Grafton, NSW (but secluded). Power, phone and building permit available. School bus handy. Laundry and shower facilities on site. Price $10,500.

John Vukovitch, Olivedale, PO Box 160, Grafton, NSW, 2461.

Central Southern Highlands, NSW at Taralga, two hours drive from Liverpool, 1¼ hours from Canberra. Near new three bedroom house with extra bunkhouse accommodation for relatives (or studio) on 25 acres, sealed access, sweeping views, electricity, phone, septic, plenty of water, Sydney TV, built-ins. Includes gentle milking cow and calf, assorted geese, chooks, fruit and nut trees, wood pile. Owner going overseas. Price $90,000.

Mrs J. M. Bridges, 53 Monash Road, Gladesville, NSW, 2111. Phone: (02) 817 2453.

For sale: 75 hectares, north-east NSW, at the head of Boundary Creek, near Kyogle and Lismore. Permanent water, basalt soil, rainforest, waterfall. Access through another property. Weatherboard house with verandahs and water tank (and plants pumping out oxygen). Suitable permaculture, hermitage, rural idylls. Price $60,000.

Phone Julienne Fisher (066) 72 3239, or write 7 Eyles Avenue, Murwillumbah, NSW, 2484.

Five acres of land, 18 miles to Rainbow Beach, 6 miles to Tin Can Bay, dam site, electricity, phone, bitumen road, property fenced. No tall trees, only shrubs and bushes. Price $18,500 negotiable.

Write H. Keachie, 1 Collingwood Road, Birkdale, Qld, 4159, or phone (071) 93 3468.

563 hectares (1350 acres), 11 miles from Tenterfield on main road to two National Parks, high rainfall, divided into six paddocks, all with permanent water. Presently running cattle, plus soyabeans. Suitable for group farming or tourist development. Price $150 per acre.

Sue Chapman, 'Hartington', Sunnyside, NSW, 2372.

Dear Irene & Keith,

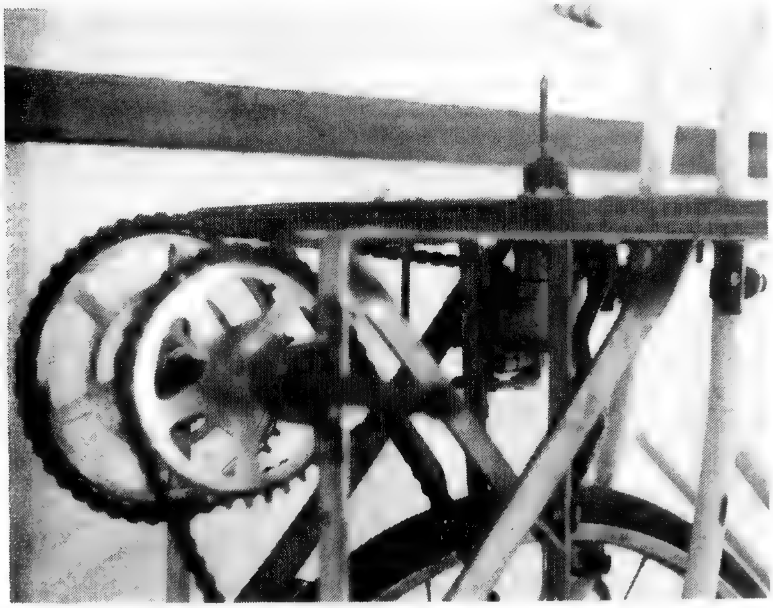
We are a Christian family of five (Dad, Mum, plus three lads, eldest 8) who have a dilemma. We own a house in Perth and 100 acres on the Donelly River, 195 miles south. We intend to move there upon building our own house.

Problem: I (Wayne) cannot do it by myself and I feel it would be most unfair to take young kids to such a rough environ. We have no assets and very little money, so cannot afford to pay wages.

Possible solution: Young to middlin' EG guy/guys or married couple with no children looking for wilderness experience. All we have to offer is 'rough as guts' accommodation, blood, sweat and tears, but the good news is that the 100 acres is the most beautiful you ever clapped eyes on and other goodies I will relate to those interested.

Shalom, Wayne, Evelyn, Aaron, Stephan and James Crow, 23 Gregory Street, Wembley, WA 6014.

PETER'S PEDAL MACHINE



By Peter van der Wyk

Preamble: This pedal machine can do the job of a juice extractor, a blender, a citrus juicer, a food processor, an electric drill and a high-speed grinder — and it outperforms them all. It can operate almost any appliance that is normally powered by an electric motor.

As it is a heavy-duty machine, it can do all of these jobs very quickly and without fear of burning out the motor. In fact, the more this motor runs, the more sweetly it runs. In other words, exercise makes you fit and healthy.

With my more advanced pedal machine model I can trickle charge a car or household battery at the same time as performing one of these other tasks. it would provide quite a fast charge for a set of rechargeable nickel cadmium batteries to power your torch or portable radio.

I have received inspiration from the book **Pedal Power**, edited by James McCullagh (Rodale Press, 1977), though I found in most cases that I could improve on these designs using cheaper parts which are more readily available and an overall design which is more efficient. Efficiency is greatly improved by using bicycle chains and sprockets, rather than v-belts and pulleys, which are also cheaper. I have used pedal power for many applications not discussed in the Rodale book.

All the material here is my own invention, or applications of my own. I do not wish to see patents on any of these machines, but rather to freely publicise material about them and to keep them in the public domain. Placing the rights to such machines in the hands of private enterprise goes against my principles and the tenets so well demonstrated by these 'people power' machines.

My first experiment with such a high-speed machine was based on a bicycle frame (similar to the one in **Pedal Power**). However, I found it wasn't stable enough, the frame had too much give and elasticity in it and it was a difficult task to get the high gearing required. With the Repco **Ergomometer** you are well on the way.

If I do need to do some heavy drilling, I hold the job to be drilled in my hands and lean down onto the drill bit in the chuck while pedalling. If I need to do finer drilling, I use a commercially available flexible drive and guide the drill by hand into whatever I'm working on as I pedal.

The multi-purpose, high speed machine described here is a modified Repco **Ergomometer.** It has a bench top bolted onto it with a vertically mounted chuck (facing upwards) coming up through the bench top, which is level with and directly in front of the handlebars. It is geared in such a way that the chuck turns 70 times or more for every one turn of the pedals. It is also freewheeling, so that you can stop pedalling and the machine keeps going for a while from its own inertia.

Most of these machines have been tried and tested for several years now.

MODIFYING THE ERGOMOMETER

This is a very involved machine and I recommend that you use a book like **Richard's Bicycle Book**, by Richard Ballantine (Ballantine Books, New York) to assist you in working on chains, bearings, wheels and chain rings.

The first thing I did was to remove the plastic chain guard and disassemble the crankset assembly (A in Fig 1) and reassemble it in reverse. You must make sure that the pedals are screwed in extra tight and that the crankset

Pedal power

Peter van der Wyk

If a job is to be performed to its utmost level of efficiency we must make a careful study of the motions involved in order to approach maximum efficiency. The art (or science) of getting the greatest return for the least amount of input (through gearing, bearings, drive mechanisms, etc) is referred to as impedance matching.

The bicycle, for instance, is the perfect transducer to match man's metabolic energy to the impedance of locomotion. If a walking man expends 0.75 calories to carry 1 gram through a distance of 1 kilometre in 10 minutes; man on a bicycle expends only 0.15 calories to carry 1 gm over 1 km in only three minutes. This illustrates very clearly the benefits to be gained by backyard research into applying this technology to all possible situations.

When we compare the human body to an internal combustion engine such as a motor vehicle we find that not only do we pollute much less, but we burn up less oxygen per unit of energy produced, we become fitter through using our muscles and we have a marvellous self-repair capability.

bearing lock ring is not likely to come undone, because it will now be turning backwards (I haven't had any trouble with mine). Then unbolt the bearing mount (B) that transfers the power from the primary chain to the secondary chain. It is not necessary to dismantle this bearing as the whole assembly is fastened onto the frame with two bolts.

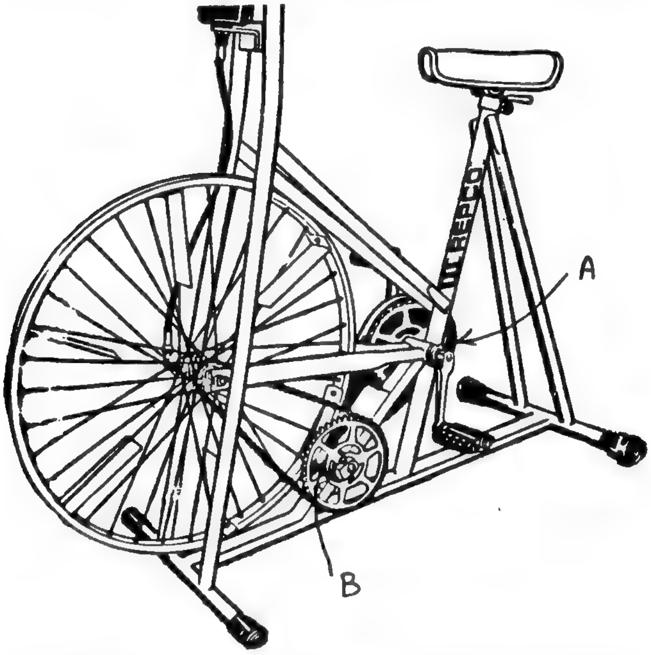


Fig. 1. Ergomometer, showing position of (A) crankset assembly and (B) bearing mounting.

The primary frame is the chain that connects to and transfers the power directly from the pedals. In this case the secondary chain is the chain that transfers the power on to the wheel. The bearing mounting (B) is then bolted on in reverse, with the primary chain on the left rather than on the right where it was.

The reason for this reversal is that when a freewheel sprocket is placed on the wheel (the wheel also being reversed), it will be operating on the right side of the wheel and in the right direction. Having a freewheel sprocket put into the system means that you can momentarily stop pedalling without having everything grinding to a halt, or having to lift your feet from the pedals and having your ankles and shins battered when you try to catch up with the pedals again (a dangerous practice).

You must remember that the whole system, when the transformation is complete, will have a great deal of momentum. All of those moving parts that will be added to the system won't want to stop in a hurry once they are in motion.

I scrapped the original wheel, speedo cable and revolution counter. If you buy a new Repco **Ergomometer,** you may be able to do a deal to get the machine at a reduced price without these parts. I bought a 36 spoke hub that takes a sprocket on both sides (double-sided hub) and spoked it into a 26 inch (65 cm) wheel onto which I could fit a tyre and have room for it in the frame. It is also possible to use a Sturmey Archer 3 speed **Dynohub** (hub dynamo) instead of the double-sided hub to trickle charge batteries.

I screw a 16 tooth freewheel sprocket onto one side of

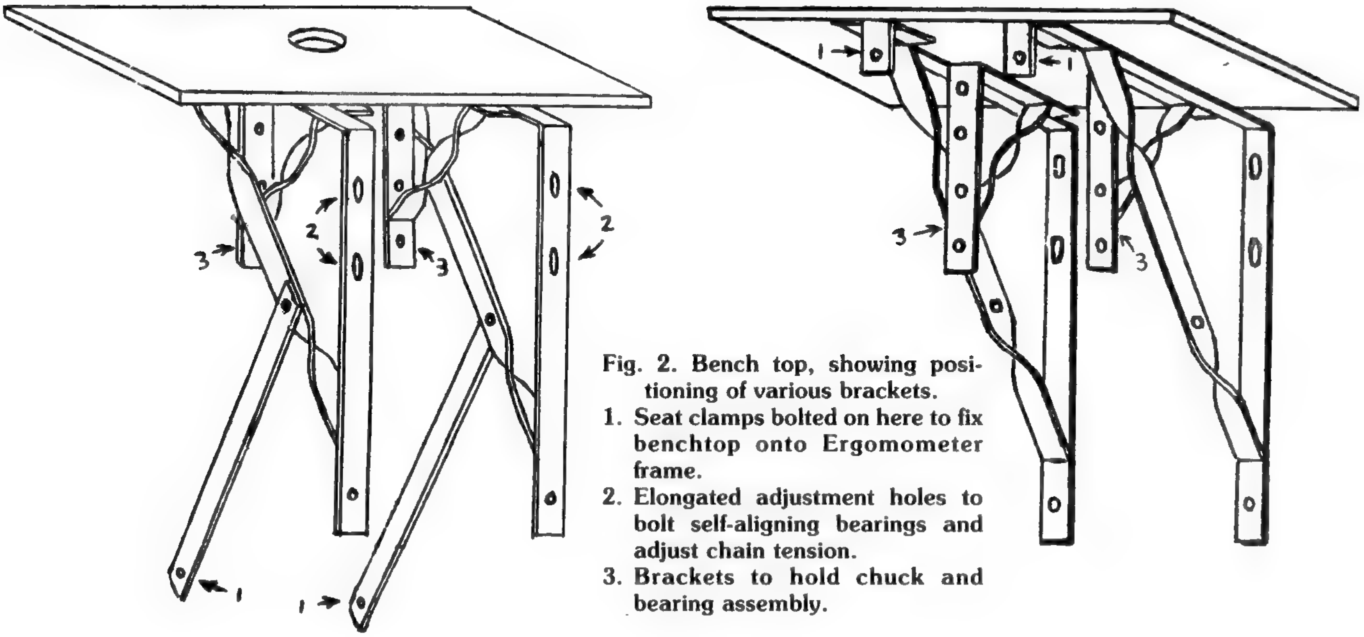


Fig. 2. Bench top, showing positioning of various brackets.

1. Seat clamps bolted on here to fix benchtop onto Ergomometer frame.
2. Elongated adjustment holes to bolt self-aligning bearings and adjust chain tension.
3. Brackets to hold chuck and bearing assembly.

the double-sided hub and a 24 tooth fixed sprocket onto the other side. The fixed sprocket should have a lock ring to stop it coming undone. Make sure that the two sprockets are screwed onto the side of the hub that is designed to take them. The lock ring fits onto the reverse thread, which is slightly smaller in diameter than the thread of the fixed sprocket.

Having seen how everything fits, remove the fixed sprocket again to have a large chain ring brazed or welded onto it. What is required is a steel chain ring of between 44 and 54 teeth. One way to make sure that the sprocket and chain wheel are well centred is to measure the diameter of both and then use a compass from a geometry set to draw out both circles onto a surface on which they can be welded together.

Place the two chain rings on top of each other on your drawing and spot weld them together when they are absolutely correct. The reason we have to be so exacting is because the chain going over the chain wheel will be travelling at very high speed and we cannot afford any degree of error.

The wheel, with sprocket and chain ring mounted, can now be put back into the machine with the right length of chain, taut, fixed into position.

BENCH TOP

I built a small bench top — 45 cm x 30 cm (1 ft 6ins x 1 ft) — out of 18.75 mm (¾ inch) marine plywood with a set of reinforced right angle brackets (available at the hardware store) bolted onto it for support. A smaller set of these brackets is bolted immediately inside the larger set and facing in the opposite direction. The larger set is fixed to the frame and the smaller set holds the chuck upright. Refer to the diagram (Fig 2) and your Repco **Ergomometer** to figure out the exact dimensions and construction procedure.

The bench top is then bolted onto the frame using 3 mm (⅛ in) or 4.7 mm (³⁄₁₆ in) flat steel as bracing and four bicycle seat clamps to clamp the whole thing onto the frame at a useful height when you are pedalling. The marine plywood used in the bench top is the type used to make concrete formwork at building construction sites and is often thrown away as scrap when the concrete has set.

DRIVE

The cheapest drive, and one that can be made to go either clockwise of anti-clockwise onto your vertically mounted chuck, is a twisted V-belt. But a chain drive connected to a right angle gearbox adaptation (I used a **Makita** angle adaptor) is quite effortless to pedal compared to a V-belt, although it can only be made to turn one way without unscrewing itself. Several makes of drill have a right angle adaptor, but I would recommend a fairly heavy duty adaptor that will take a 12.5 mm (½ in) chuck.

With the angle adaptor you will need the assistance of your local engineering works. If you take the sprocket holder out of a back-pedal brake hub or 3 speed gear hub of a rear bicycle wheel, they should be able to soften the metal, to cut the right angle thread into it to fit the angle adaptor and harden it again. You then fit a 14 tooth sprocket onto this holder.

The **Makita** angle adaptor comes with a sleeve with two bolts through it. I cut this sleeve into three cylindrical slices of about equal size and used the two with the bolts through them to fix the angle adaptor into place. I had to make up two smaller right angle brackets to connect the bolt in the sleeve to the two smaller right angle brackets underneath the bench top. I mounted the chuck on the high speed end of the adaptor and the sprocket on the low speed end.

If you are going to use a twisted V-belt, I would recommend 'M' section belts and pulleys. You will need four 15.6 mm (⅝ in) self aligning bearings, ⅔ metre (a couple of feet) of 15.6 mm bright mild steel shaft, a small pulley, for example 37.5 mm (1.5 in) that fits onto the 15.6 mm shaft under the chuck, and a chuck of your own choice. Take the chuck and shaft to your local engineering works and get them to marry the two together.

Now cut this shaft shorter to fit the machine and clear the wheel. The remainder of the shaft can be fitted into another position.

Onto the supporting brackets for the bench top (not the shuck mounting brackets) we fit two 15.6 mm (⅝ in) self aligning bearings. These bearings are mounted on the front about 75 mm (3 in) below the bench top. Through these two bearings goes a short length of 15.6 mm shaft onto which you fit two cotter pin crankshaft chain rings, one large (say 46 tooth) and one smaller (say 28 or 30 tooth). Both of these cotter pin chain rings will need to have their pedal arms sawn off. You may be able to get them from your local bicycle shop cheaply if they have a damaged pedal arm (from bicycles needing repairs).

The bearings bolted onto the front of the bench top will need to have elongated holes, say 12.5 mm (½ in) long, in the brackets onto which they are bolted to allow you to take up the slack in the chain that connects from the wheel into this shaft. Now slide the two chain rings (or chain ring and pulley) onto this shaft. The smaller one must align with the chain. Once you have found the right position you can mark it so as to file a flat onto it for the cotter pin. Line the second chain ring with the right angle chuck adaptor sprocket and mark it off as well. Now you can file the flats for the cotter pins.

The brackets that hold the chuck will also need elongated holes (on the face against the bench top) in order to take up the slack in the final chain or V-belt. Keep in mind that after the machine is finished and in operation the chains (and belt) will need periodic adjustments as they stretch and occasionally need replacing.

You should stop now and look at each chain drive. Get a piece of paper and write down in one column the number of teeth of each sprocket or chain ring nearest to the pedals and in a second column the number of teeth of each sprocket on the other end of each chain. Multiply all the numbers in the first column together and do the same for the second column.

If you are using a right angle adaptor, for example, your column may look like this:

46	14
46	16
46	28
46	14
4,477,456	87,808

If we divide the number in the first column by the number in the second column we get 51. Now multiply this figure by the gearing in the angle (1.5):

51 x 1.5 = 76.5

So in this instance the chuck will turn 76.5 times for every one turn of the pedals. This is a reasonable gear to operate a juice extractor. If your gear is higher, I would recommend a larger sprocket on the angle adaptor.

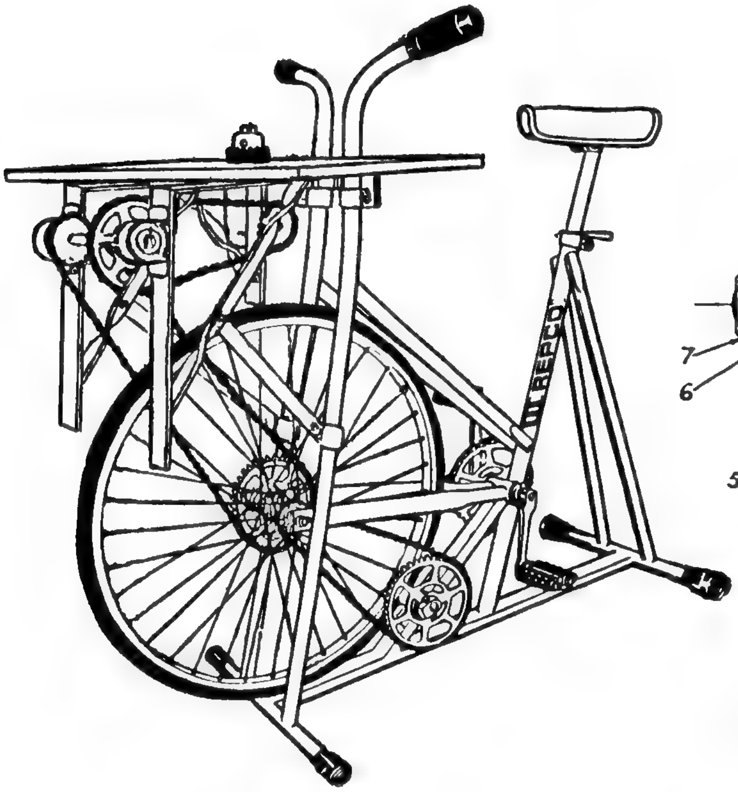
With a V-belt system your figures might look like this:

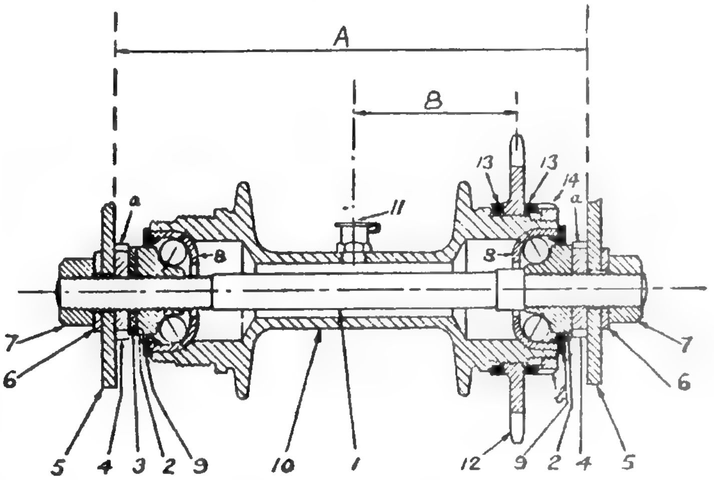
46	14
46	16
46	28
97,336	6,272

Divide 97,336 by 6,272 and you get 15.5. In order to make this into a 75:1 gear ratio we need to divide 75 by this figure and multiply the answer by the size of the pulley on the chuck shaft:

75 ÷ 15.5 = 4.83

Multiply this by the size of the pulley (say 1.25 in) and you get an answer of 6, so we need a 6 in (15 cm) pulley to drive the final V-belt of our pedal machine.

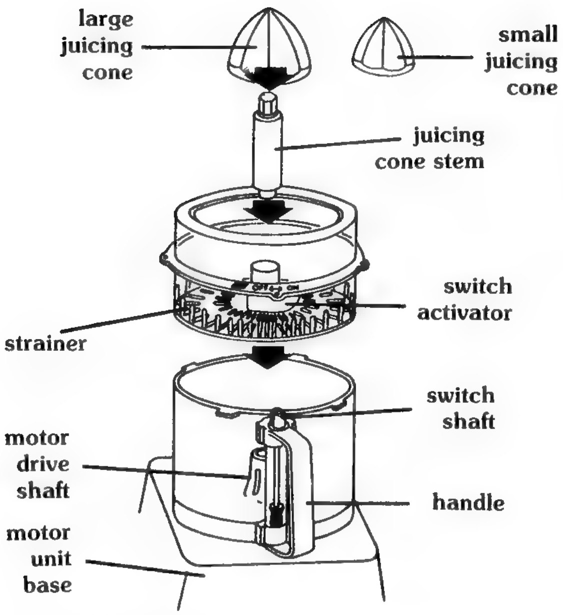


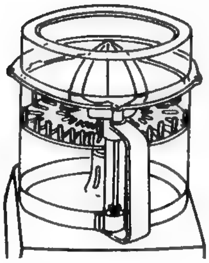


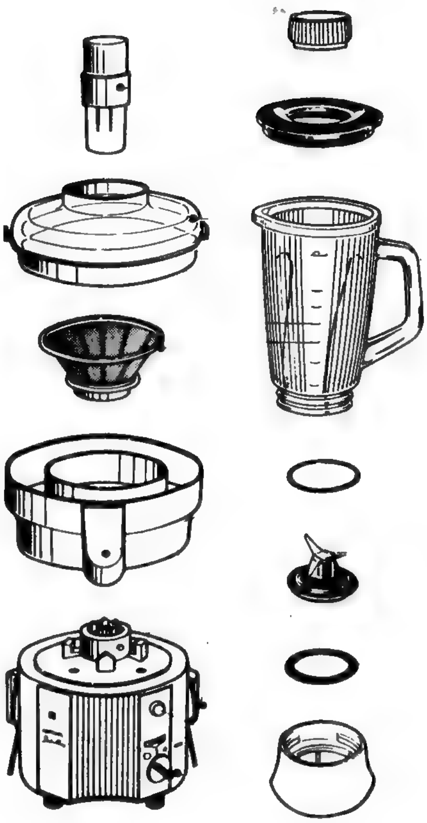
A "SAWN THROUGH" VIEW OF A REAR HUB

1. Spindle
2. Cone
3. Adjusting Washer
4. Lock-nut
5. Fork Ends
6. Washer
7. Spindle Nut
8. Ball-cup
9. Dust Cap
10. Hub Shell
11. Lubricator
12. Sprocket
13. Sprocket Packing Washers
14. Sprocket Lock-nut

Dimensions A : Overall length or distance between fork ends
Dimensions B : Chainline (measured from centre of hub)







Modifying kitchen appliances. These illustrations show the various parts of kitchen gadgets which may be modified to use with Peter's pedal machine, but are not intended as a "how-to" sequence.

Pedal appliances

Modifying kitchen gadgets for the pedal machine

I have been collecting kitchen appliances that people throw out. It is usually too expensive to repair these gadgets so most suburban tips would have a few scattered amongst the refuse. Electrical repair shops frequently have such machines left with them to be fixed but which are not picked up by the owner.

Of course you could always have **two** pedal machines, one in the workshop for drilling and so on and another in the kitchen. But if you want one machine to do the job of a handy all-purpose drill **and** do the kitchen stuff, it is important that the kitchen gadgets you wish to adapt are designed to turn counter-clockwise as seen from above. If there are sharp edges in the appliance, it is simply a matter of seeing which way these edges are facing. If the moving parts are held together by a screw thread you must check whether the appliance will come apart when the shaft is turning in the counter-clockwise direction.

By removing most of the motor except for the shaft and top bearing you can place these appliances over the chuck down onto the shaft. **Hocus pocus, presto!** We now have a pedal powered juice extractor, blender or whatever.

It may be necessary to modify your appliances in a number of ways to suit the pedal machine. The housing of the former electric motor may need to be cut a little shorter if the chuck won't quite reach the shaft. If there are electrical windings on the shaft that get in the way where the chuck should go it will be necessary to remove the entire shaft from the appliance.

Remove all bearings and bits of plastic from the shaft. If you now put this shaft in a small fire for up to half an hour you will find the electrical windings easier to remove. A low- to middle setting on a gas burner will do. Some of the resin that insulates the wire may catch alight and — **as long as it is burning in a safe place** — that is just what you want. Let it cool down a bit and place it upside down in a vice so that the windings are resting on the vice but the vice is not touching the shaft. Place a heavy lump of wood on the end of the shaft and hit it with a heavy mallet or hammer, checking that the other end of the shaft does not come to any harm by being bashed into something.

Once the end of the shaft that you are bashing is level with the windings, you will need a punch rod to bash it through. When you've got it out you may need to file, grind or cut the end of the shaft to fix up any damage that may have occurred from hitting it. But since it was the bottom end of the shaft that you were bashing (hopefully), this end will be inserted into the chuck and a few marks on it shouldn't affect its performance.

Now reassemble your modified appliance and try it out on pedal power.

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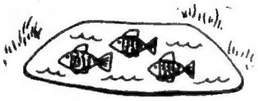

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The best of 10 years of *Earth Garden* articles. How to build in mudbrick, rammed earth and stone, grow your own food, keep small livestock, make handcrafts, use solar, wind and water power with many ingenious plans and ideas and lots of inspiration from new settlers. Includes a comprehensive *Access Directory*.

A winter message

Dear friends,

It's icy cold as we write this mid-year message to all our readers. Strange how the peach tree always comes into blossom just in time for the wind to blow them away! We hope this new issue of Earth Garden will brighten up the long nights and days.

Mid year is also the end of the financial year, when we tend to take stock of our situation and usually offer a subscription for the year ahead. Like many Australians, we are finding this year that the times are truly tough. This, together with the uncertain economic climate (especially in regard to threatened Government sales and wholesale taxes) makes it difficult for us to estimate costs ahead. So for the time being we are only offering subscriptions up to Earth Garden No. 50, out in mid May, 1986. That's the next three issues, EG48 to EG50, posted for $8.25. We'll have all this sorted out and let you know next issue, which being the end of the year is when most subscriptions are due for renewal.

We've decided to start charging for land lines from Earth Garden No. 48 (November 1985). This service has helped a lot of people over the past 13 years. However, it involves a lot of extra time and paperwork for us. We also feel that restricting listings to current subscribers is unfair to those people who buy regularly at bookshops and newsagents. From now on there will be a charge of $12.00 for each land line of a maximum of 50 words. This opens up the question of whether or not we should have suitable advertisements in Earth Garden. It would obviously help in our financial survival and keep the cover price down - and it could provide an extra service to you.

Meanwhile, you'll see that we have some bargain buys for you - **The Illustrated Earth Garden Herbal** at only $5.50 posted anywhere in Australia (add $1.00 for overseas seamail) and the last copies of our best-selling **First and Third Earth Garden Books** at $9.00 posted.

Well, the days are already getting longer, so spring is around the corner. Time to turn over the compost pile and start getting the garden ready for planting. That should warm us up! Until next time.

Peace & Love,
Keith & Irene

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EG22-23: Australian Access 150 page sourcebook — Aborigines . . . organic food growing . . . permaculture . . . Bill Mollison . . . earth building . . . wind . . . solar . . . water power . . . solar cells . . . water supply . . . bucket pump . . . with access to groups, books, tools and techniques . . . small scale technology.

EG24: Place — 24 groups and new settlers share their place outside the cities . . . including Mare Carter . . . Ron Edwards . . . Neil Douglas . . . Gundaroo Store . . . Rainbow Region . . . Universal Brotherhood . . . Mt Oak . . . Moora Moora . . . bush ashram . . . personal stories from 20th century pioneers.

EG25: Australian Access 2 — 130 page sourcebook — livestock acquaculture . . . fencing . . . wombat gates . . . killing . . . tanning . . . food and nutrition . . . Dorothy Hall . . . a year's supply of food . . . grain grinders . . . mincers . . . methane basics . . . wind generator . . . low energy solar homes . . . greenhouse . . . more tools & techniques.

EG26: Colour spread on the earth-built kasbahs of Morocco . . . owner-builders report on homes of stone, timber and mudbricks . . . build a slab cottage . . . tree felling . . . two solar-electric homes . . . Earth Garden survey . . . survival vineyard . . . acorns . . . fruit without poisons . . . compost dunny . . . home-made gas . . . quandong . . . pumpkin recipes.

EG27: Plants we eat — 100 tropical food plants for Australia (part 1) . . . plant protein . . . 16 legumes to grow & eat . . . like winged bean . . . pigeon pea . . . lablab bean . . . cowpea . . . sword bean . . . chickpea . . . sugar pea . . . mung bean . . . soybean . . . adzuki bean . . . life-raft . . . blacksmithing . . . bluestone building . . . mudbrick solar home . . . wok cookery . . . choko . . . homebirth.

EG28: Animal stories — by packhorse through the Victorian Alps . . . horse & buggy . . . Mary's black sheep . . . the woolly Merino . . . Timbertown bullocky . . . tropical food plants for Australia (part2) . . . stringybark baskets . . . tamarillo . . . buying bees . . . solar trike & fan . . . make a poker . . . persimmon . . . seed patents.

EG29: Mudbrick primer — the monastery at Stroud . . . six builders & their mudbrick experiences . . . mud barbecue . . . Bob's bonza brickmaker . . . earth floors . . . curved walls . . . herbs on the roof (sod it!) . . . low energy design . . . the cutting axe . . . food plants for tropical Australia (part 3) . . . coconut mats . . . mango mania.

EG30: Organic growing guide . . . the organic idea . . . food without poisons . . . making compost in heaps, pits, trenches, boxes, bins & barrels . . . carpet the garden . . . wot no digging? (mulch it instead) . . . organic methods for the semi-arid West . . . compact growing boxes . . . a traditional farmer . . . preserving figs . . . tasty tempeh . . . the Bornhoffen story . . . pasta . . . glass bottle mosaics . . . trickle watering.

EG31: Energy alternatives at work — make your own hydraulic ram . . . second-hand windpump . . . mudbrick sequels . . . freezing food . . . blanching . . . choosing a freezer . . . zucchini glut . . . drying fruit . . . all about sprouts . . . fireless cookers (hot boxes and baskets) . . . camp oven . . . growing greens in the wet . . . building a log house (part 1) . . . index (EG21-EG30).

EG32: Trees — tribute to trees . . . St Barbe Baker . . . tree tales . . . how a tree works . . . the miracle of a leaf . . . native trees from seed . . . trees on the farm (interview with Tim Cox) . . . forestry directory . . . dieback . . . renewing the land . . . coppicing . . . the woodchipper blade . . . value of trees . . . artist in the bush (interview with Neil Douglas) . . . low-cost country home building . . . cob does the job . . . building a log house (part 2) . . . square foot gardening.

EG33: Tenth anniversary issue . . . use of wood . . . timber felling . . . lifting poles . . . post-and-beam design . . . building a log house (part 3, concludes) . . . parquet floors . . . backyarders' livestock . . . goats . . . rabbits . . . fowls . . . portable hen-house . . . dandelions . . . wild tea party . . . bush regeneration . . . planning figs . . . dry pit loo . . . blackberry-eating beetle . . . weeding tools.

EG34: A look at China (extra colour photos) — the commune system . . . teaching the masses . . . trees of friendship . . . forestry . . . fish farming . . . recycling human wastes . . . biogas . . . transport . . . travel notes . . . Ron Edwards writes on earth building the Chinese way (and tea) . . . making the farm pay . . . places . . . bread & jam . . . rainforest . . . eco-gardening.

EG35: Bees and trees — Tributes to Richard St Barbe Baker . . . tree tales . . . backyard bees . . . hiving a swarm . . . St Barbe's bees . . . a beginner's kit . . . beekeeping books, equipment, clubs and information . . . nectar-yielding eucalpyts . . . self-build housing . . . mudbrick workshop . . . earth wall footings . . . make your own solar collector . . . a good workdog . . . magpies . . . wormiculture . . . nuclear nightmare . . . waste to compost . . . fodder trees.

EG36: Settling in at Nimbin — glimpses of Nimbin . . . settler's tales . . . interview with with a woman builder . . . handbuilt homes . . . a pawpaw plantation . . . simple, cheap, solar electric systems . . . passive solar 'rules of thumb' . . . biological building . . . farm sructures . . . a potty garden . . . choughs . . . bush birds . . . the inn at Ollantaytamboo, Peru . . . more fodder trees . . . make a lavender sachet . . . the food page . . . nuclear-free Australia?

EG37: Hard times — sidestepping the recession . . . new paper from old . . . newspaper fuel . . . rags to rugs . . . barter . . . when the lights go out . . . slush lamps . . . sawdust stove . . . tin can cooker . . . the hungry 30s . . . Depression dodges . . . Happy Valley humpies . . . hand grain mills . . . 120 money-saving hints . . . make soap . . . whitewash . . . polishes . . . cleansers . . . glue . . . insect repellents . . . passive solar design . . . roof ponds . . . donkeys at work.

EG38: Access survey — where to buy alternative energy equipment . . . electric grain grinders . . . Hard Times tucker . . . back to basic bread . . . steam cooking . . . sustaining soups . . . no-meat meals . . . solar dried bananas . . . yoghurt . . . summer cheese . . . cheap meat meals . . . home-brewe beer . . . coofee form tree to cup . . . a Gujarati village . . . Noel's Island . . . Wild Country Park . . . Depression days . . . earth walls and bushfires . . . mudbrick hermitage . . . the electromagnetic house (building biology) . . . Self-Build success . . . Hondas on the farm . . . sweet cherries . . . winter in the vineyard.

EG39: Alternative technology — low-voltage small-scale . . . run lights and TV from your car battery . . . Peter Pedal's bicycle wheel wind generator . . . farm energy system . . . fire without matches . . . mushfire defensive house . . . earth building notes . . . the indoor climate (building biology) . . . backyard food growing . . . a sense of humus . . . try herbs . . . rosehips . . . avocado growing guide . . . laying out a farm . . . the vineyard in spring . . . dairy notes, 1898 . . . bread happiness . . . old-time household hints.

EG40: Communities — "constructive alternatives" . . . Communiversity . . . village in the making . . . start a food co-op . . . making the co-op work . . . three in a caravan . . . Scott Nearing — a good life . . . how we make cyder in Tasmania . . . trees for fire protection . . . tree planting at Undalya . . . the self-built house . . . The Muddies Manual . . . raw earth . . . earth floors . . . bushfire resistant housing . . . boiling the billy . . . hares . . . tetanus . . . laying out a farm (part 2) . . . olive oil . . . cashew nuts.

EG41: Wandering — across the Sahara . . . Uganda . . . in Australia with pack donkeys & by horse float . . . the lure of Timbuktu . . . adventure travel access . . . Sahara mat-tents . . . Moora Moora 10 years on . . . build a Savonious rotor bike wheel wind generator (Peter Pedals) . . . energy access . . . yeastless breads . . . dampers . . . build a shadehouse . . . food co-op books . . . recipes for real potatoes . . . sheep stories . . . index, EG31-40.

EG42: Building — earth-covered homes . . . the Burra dugouts . . . our stone home (slipform technique) . . . flood-defensive house . . . build a Chinese pigsty . . . mudbrick notes . . . compost power (methods of Jean Pain) . . . tomato tips & treatment . . . herbal insecticides . . . deep ecology . . . EG reader survey . . . breaking in the Fergy . . . earth travel . . . the Tuareg . . . bourgeois communes!

EG43: Earth domes & vaults — Eukey pink palace . . . rendering earth walls . . . bush stone masonry . . . mudbricks . . . farm systems . . . bush shower . . . Peter Pedals' Pelton wheel & incinerator hot water . . . remote power systems . . . low voltage wiring . . . sheet metal pans . . . sheep . . . donkeys . . . horses . . . farming with wildlife . . . Daintree . . . travelling with kids . . . energy access.

EG44: Plug in the sun — solar electric systems . . . 12V to 240V systems . . . first-hand reports . . . solar panel booster . . . the Solar Trek . . . batteries . . . inverters . . . alternative washdays . . . Peter Pedals on petrol, Pelton wheel & pedal-driven washers, how to make a pedal drier and 12V computers . . . beans for fish . . . using water wisely . . . outdoor cookstove . . . Mebbin Springs . . . greens for the fowls . . . mudbrick methods . . . sheepskin rugs . . . Keith & his Mac. More!

EG45: Waterworks — shifting water with sun, wind and water . . . solar electric pumps . . . hydraulic ram . . . gravity feed . . . fuelless Platapump . . . windmill & pulley . . . water power . . . Brisbane 'no mains' solar powerhouse . . . cyclone-defensive house . . . mudbrick walls . . . Melbourne's solar workshop . . . a woman goes bush alone . . . grow bunya nuts . . . collect eucalyptus seed . . . propagate bamboo . . . cardomum . . . tree crops miscellany . . . Babaco . . . beekeeping . . . Peter Pedals writes on 12V appliances & battery problems . . . greeting cards . . . homemade suntan lotion . . . finding true north . . . supermarket survival . . . self-sustaining garden . . . 'no volts' ironing . . . bird scarer . . . graphics on the Macintosh . . . more!

EG46: Windworks — electricity from the wind . . . energy updates and access . . . solar trackers . . . lights in the bush . . . super Krypton lamps . . . house water from a 12V bilge pump . . . Watts up, Doc? . . . super loos: two owner-built composting toilets . . . urban homesteading . . . lessons from the Maryborough fires . . . vegie patch revival . . . car-less in the country . . . growing algae, bush women, town edge community . . . aerial photos . . . a taste of Tanzania . . . herbal shampoo . . . dried flowers . . . . . . buckwheat recipes . . . lemons . . . WWOOF . . . growing plants and children in North Queensland.